Crusader
ENGINES

MARINE ILLUSTRATED PARTS MANUAL

MODEL MP454 XLi

SERIAL NUMBER 101810 THRU 103880

MODEL MP7.4L

SERIAL NUMBER 103538 AND ABOVE

This Page Was

Intentionally

Left Blank

Contents:

“TYPICAL VIEWS ARE SHOWN”

ENGINE ROTATION

Engine Rotation is identified as “RH” or “LH” with the engine model number. Rotation always is determined from the flywheel end looking toward the front of the engine. In some instances, propeller shaft rotation may be opposite to that of the engine.

When ordering a replacement engine, production block or parts for the engine, be certain to check engine rotation. **DO NOT rely on propeller rotation in order to determine engine rotation.**

LEFT-HAND ROTATION is STANDARD ROTATION.

(Flywheel turns counterclockwise when viewed from flywheel end of the engine.)

RIGHT-HAND ROTATION is OPPOSITE ROTATION.

(Flywheel turns clockwise when viewed from flywheel end of the engine.)

HOW TO READ THIS PARTS BOOK:

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RB001006F	**Base Engine Assembly**, 7.4L	1
(1)	(2)	(3)	(4)

(1) ITEM NUMBER - This number corresponds with the number in the exploded view on the facing page.

(2) PART NUMBER - This is the designated part number for the particular component or assembly.

(3) DESCRIPTION - This identifies what the component or assembly is.

(4) QUANTITY - This refers to the number of pieces used.

Symbols shown throughout parts list are defined here or on the bottom of the individual parts list page.

AR	=	As Required
OPT	=	Optional
NSS	=	Not Serviced Separately
NA	=	Not Available
SS	=	Single Station Control
DS	=	Dual Station Control
OS	=	Oversize
US	=	Undersize
NS	=	Not Shown
TBD	=	To Be Determined
NI	=	Not Illustrated

REPLACEMENT PARTS:

WARNING:

Electrical, ignition and fuel system components on Crusader Engines are designed and manufactured to comply with U.S. Coast Guard rules and regulations to minimize risks of fire or explosion.

Use of replacement electrical, ignition and fuel system components which do not comply with these rules and regulations could result in a fire or explosion hazard and should be avoided.

GASKET AND DECAL KIT NUMBERS:

Description	Part Number
Complete Engine Overhaul Gasket Set	
Valve Grind Gasket Set	
Oil Pan Gasket Set	
Intake Manifold Gasket Set	
On Board Spare Parts Kit	

==

MAINTENANCE ITEM PART NUMBERS:

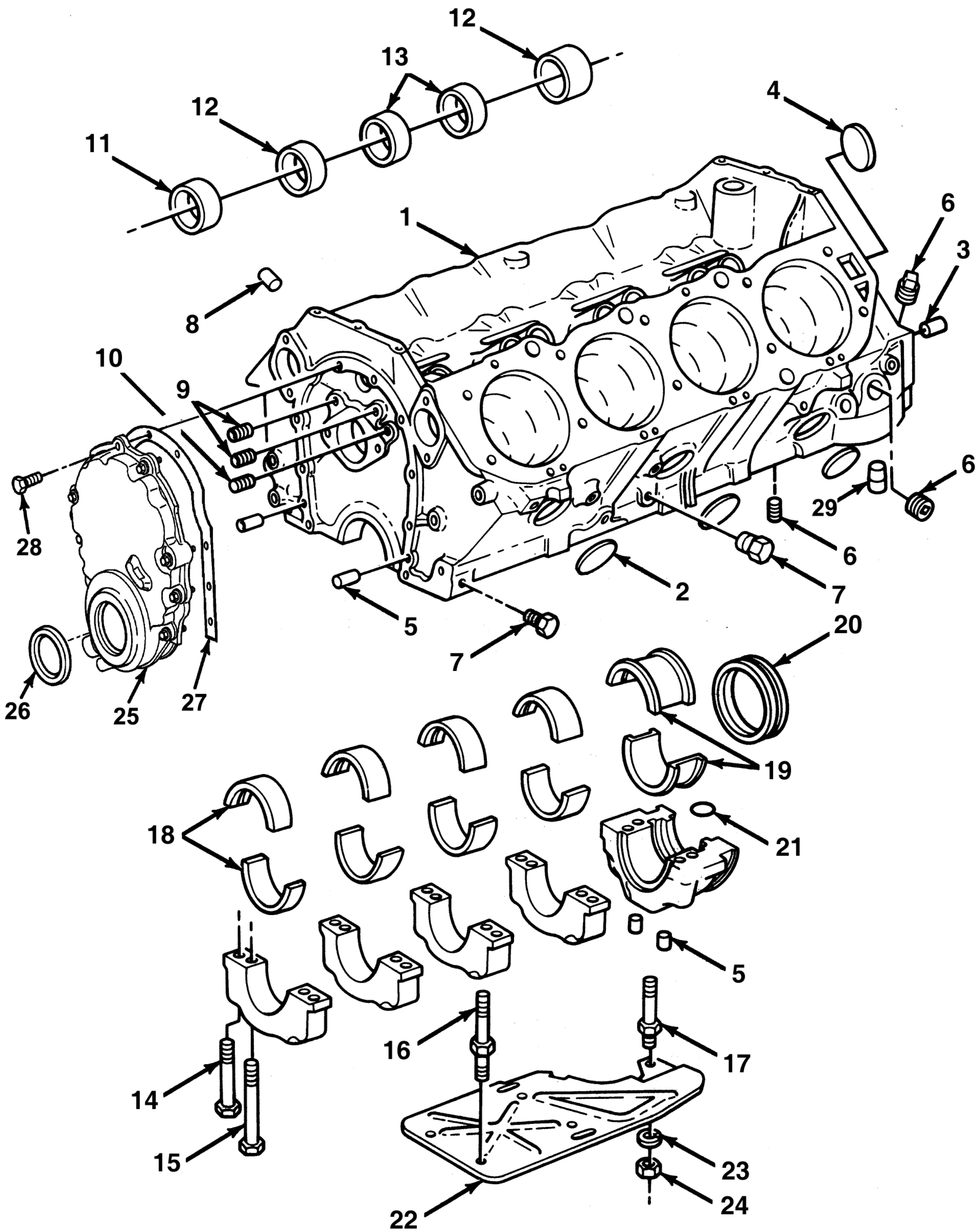
Description	Part Number
Oil Filter	22679
Fuel Filter	47038
Spark Plugs	RPO30008
Spark Plugs (platinum)	49078
Spark Plug Wire Set	98171
Alternator Drive Belt	98210
Raw Water Pump Drive Belt	10258

MARINE TRANSMISSIONS:

Crusader Engines are equipped with Velvet Drive or Hurth Transmissions or “V”-drives. If transmission parts are required, contact your dealer or closest Crusader Parts Distributor for required parts.

Parts manuals and overhaul manuals are available through Crusader Distributors.

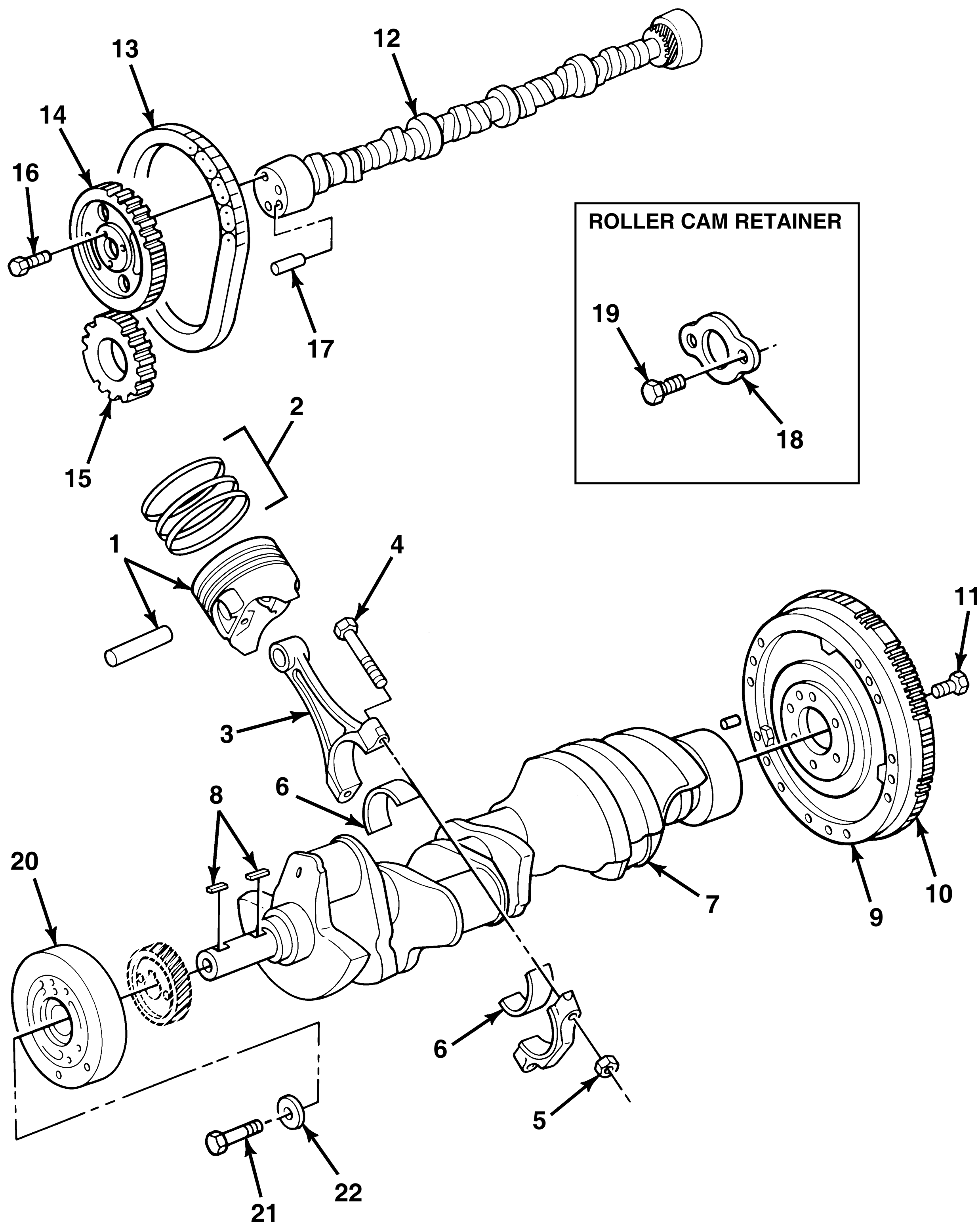
CYLINDER BLOCK ASSEMBLY - FIGURE 1



CYLINDER BLOCK ASSEMBLY - FIGURE 1

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
*	RB001006F	**Production Block Assembly**	1
1	NSS	**Cylinder Case Assembly**	1
2	R069066	**Core Plug** (1-1/4”)	6
3	7140480	**Pin,** dowel – aligning	2
4	7050200	**Plug,** camshaft bearing hole	1
5	7100330	**Pin,** dowel – aligning	4
6	RS3557	**Plug,** pipe (3/8”)	5
7	RS3552	**Plug,** pipe (1/4”)	4
8	R022021	**Dowel,** cylinder head aligning	4
9	7050090	**Plug,** oil vent	2
10	7050270	**Plug,** pipe	1
11	7050020	**Cam Bearing #1**	1
12	7050030	**Cam Bearing #2 & #5**	2
13	7050010	**Cam Bearing #3 & #4**	2
14	7050260	**Bolt,** main bearing cap (Short)	10
15	7050130	**Bolt,** main bearing cap (Long)	6
16	7050350	**Stud,** main bearing cap	4
17	7100470	**Stud,** oil pump attaching	1
18	7050120	**Bearing,** crankshaft main (STD)	4
18	7050790	**Bearing,** crankshaft main (.010 US)	AR
18	7050800	**Bearing,** crankshaft main (.020 US)	AR
19	7050150	**Bearing,** rear main (STD)	1
19	7050810	**Bearing,** rear main (.010 US)	AR
19	7050820	**Bearing,** rear main (.020 US)	AR
20	R047205	**Oil Seal,** rear main (LH ROT)	1
21	7050160	**O-Ring,** oil seal rear main cap	1
22	31131	**Baffle Assembly,** oil pan	1
23		**Washer,** baffle mounting stud	5
24	7150750	**Nut,** baffle mounting stud	5
25	7071060	**Cover,** crankcase front (Composite)	1
26	R047220	**Oil Seal,** front cover	1
27	7130260	**Gasket,** front cover1	
28	7071250	**Bolt,** front cover	10
29	98173	**Valve,** pressure relief	
		NOTE: Production block assemblies include all internal parts, cylinder head, intake manifold, flywheel, and circulating pump.	

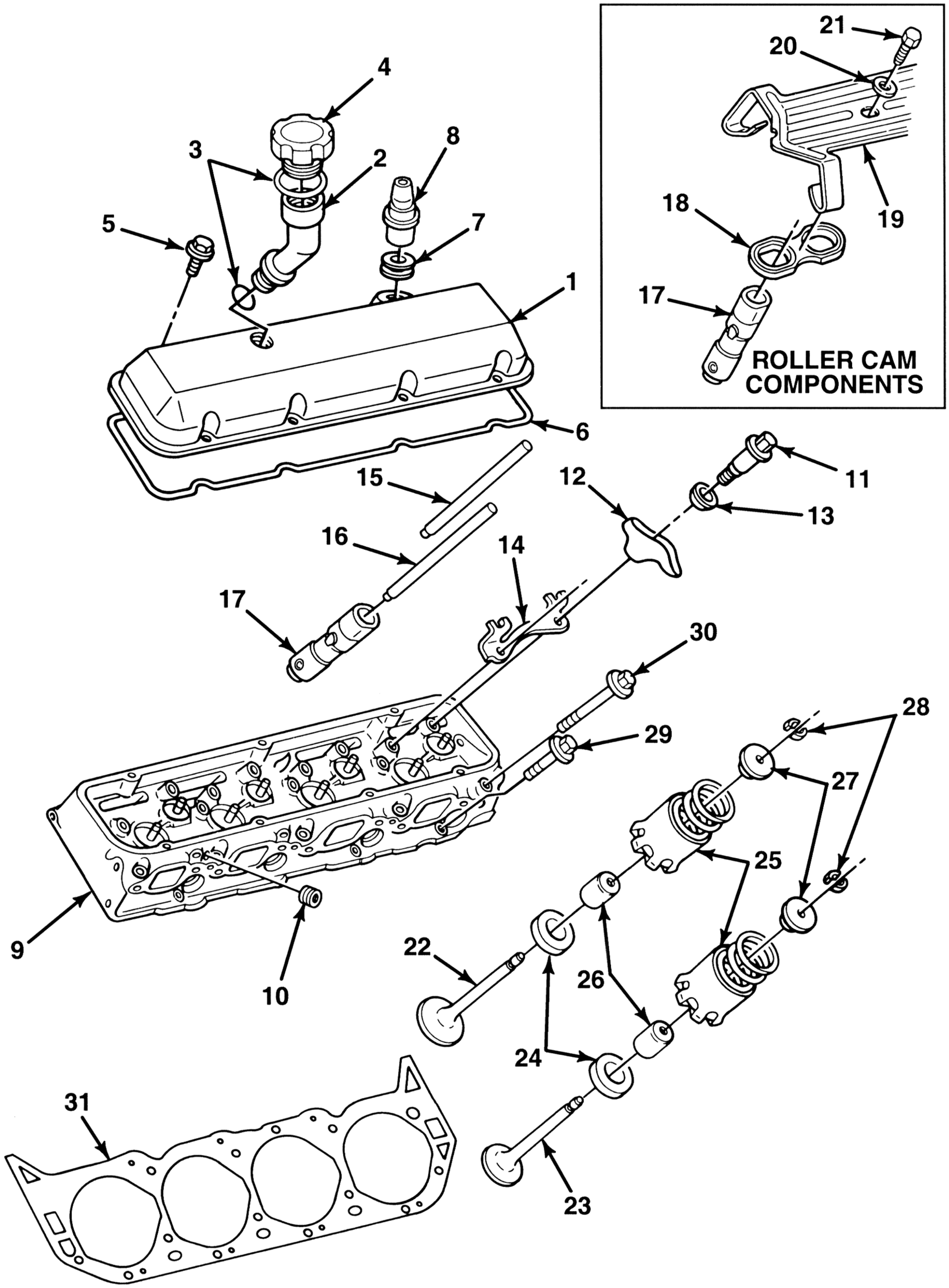
CRANKSHAFT, CAM AND PISTON ASSEMBLY - FIGURE 2



CRANKSHAFT, CAM AND PISTON ASSEMBLY - FIGURE 2

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	7080200	**Piston and Pin Assembly** (STD)	8
1	7080210	**Piston and Pin Assembly** (.030 OS)	AR
2	7080180	**Ring Set,** piston (STD)	8
2	7080100	**Ring Set,** piston (.030 OS)	AR
3	RA011009	**Connecting Rod Assembly**	8
4	7080040	**Bolt,** connecting rod cap	16
5	7080050	**Nut,** connecting rod cap	16
6	7050190	**Bearing Set,** connecting rod (STD)	8
6	7050830	**Bearing Set,** connecting rod (.010 US)	AR
6	7050840	**Bearing Set,** connecting rod (.020 US)	AR
7	7070230	**Crankshaft Assembly** (LH ROT)	1
8	31143	**Key,** timing gear and balancer	2
9	RA138009A	**Flywheel Assembly** (14”)	1
10	7070070	**Ring Gear,** flywheel	1
11	R009140	**Bolt,** flywheel to crankshaft	6
12	7071050	**Camshaft Assembly** (Roller Lifter)	1
13	7080160	**Chain,** camshaft timing	1
14	7071260	**Sprocket,** camshaft timing	1
15	7071270	**Sprocket,** crankshaft timing	1
16	30698	**Bolt,** sprocket to cam (3/4”)	3
17	7100330	**Pin,** camshaft sprocket	1
18	R109050	**Camshaft Thrust Plate**	1
19	7070700	**Bolt,** thrust plate retainer	2
20	7071080	**Harmonic Balancer**	1
21	7070060	**Bolt,** balancer to crankshaft	1
22	7070040	**Washer,** harmonic balancer bolt	1

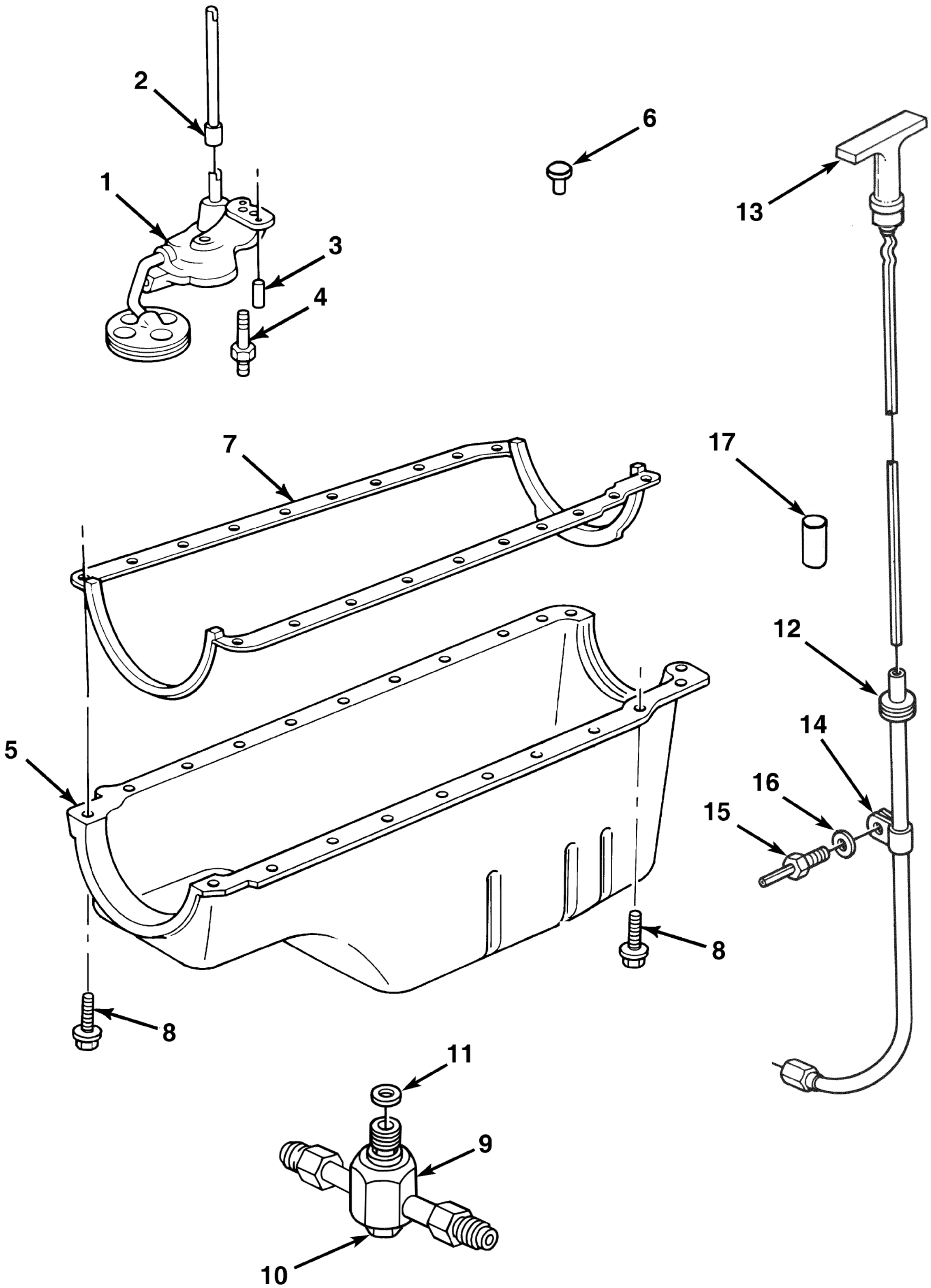
CYLINDER HEAD ASSEMBLY - FIGURE 3



CYLINDER HEAD ASSEMBLY - FIGURE 3

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	7231720	**Cover,** rocker	2
2	23551	**Riser,** oil fill	2
3	22844	**O-Ring,** oil fill riser seal	2
4	R034038A	**Cap,** oil fill	2
5	31114	**Bolt,** rocker cover retaining	14
6	RM0247	**Gasket**, valve cover	2
7	7231740	**Grommet**, valve cover	1
8	49049	**PCV Assembly**	1
9	7231750	**Cylinder Head**	2
10	7140180	**Plug**, pipe (1/2”)	2
11	7230070	**Bolt**, rocker arm attaching	16
12	7230090	**Rocker Arm**, valve	16
13	7231760	**Ball**, rocker arm	16
14	31142	**Guide,** push rod	8
15	7231630	**Push Rod**, intake	8
16	7231640	**Push Rod**, exhaust	8
17	R040004	**Valve Lifter**, hydraulic	16
18	R037004	**Restrictor**, valve lifter	8
19	R090253	**Retainer**, valve lifter	1
20	33753	**Washer**, retainer mounting	3
21	TBD	**Bolt**, retainer mounting	3
22	R043024	**Valve**, intake (STD)	8
23	R043026	**Valve**, exhaust (STD)	8
24	R049013	**Rotator Assembly**	16
25	7231700	**Valve Spring Assembly**	16
26	7230160	**Seal**, valve stem (All)	32
27	R049014	**Cap**, valve (All)	16
28	R049010	**Retainer**, valve stem	32
29	7050300	**Bolt**, cylinder head to block (Short)	8
30	7050280	**Bolt**, cylinder head to block (Long)	24
31	RM0227	**Gasket**, cylinder head	2

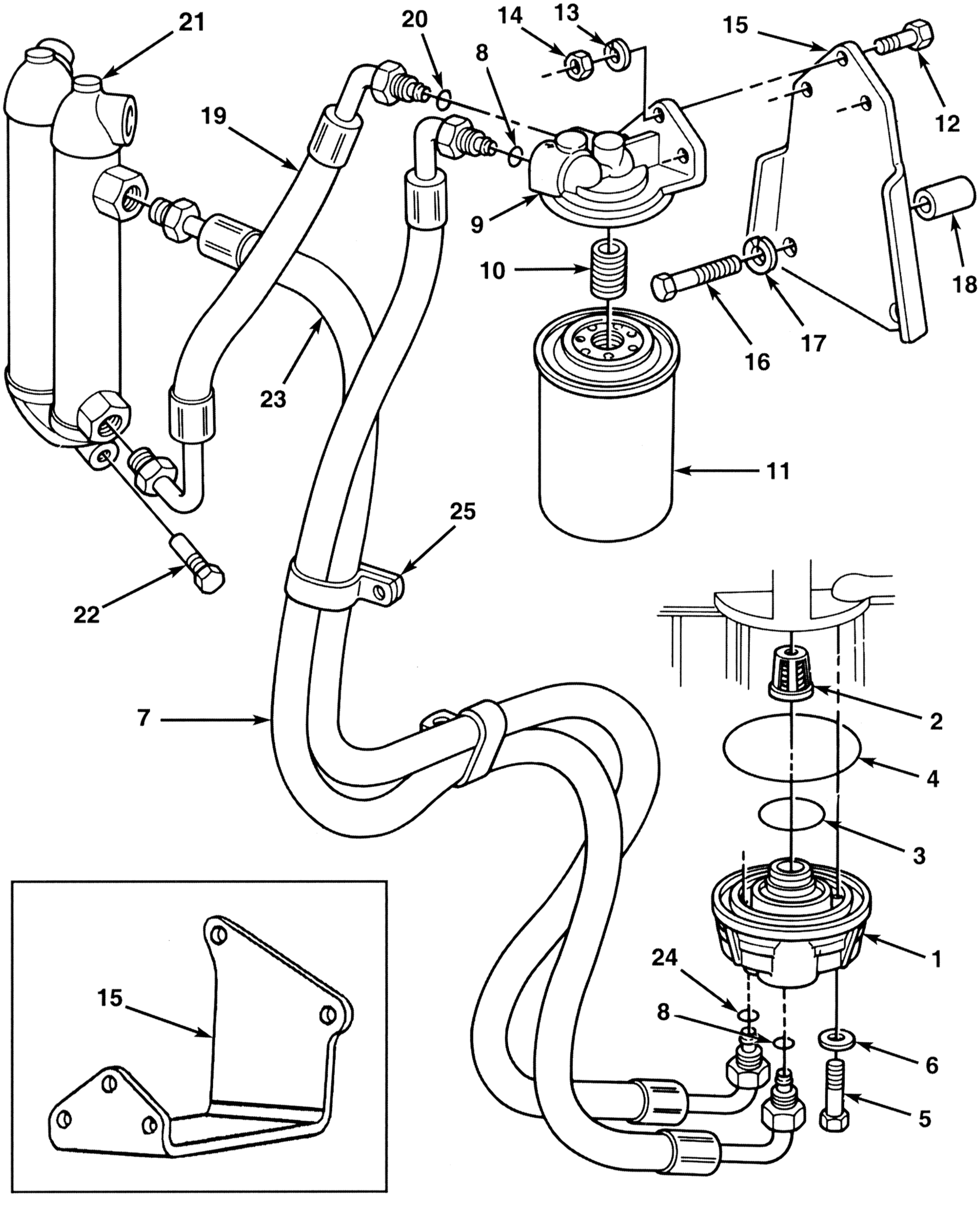
OIL PAN and OIL PUMP ASSEMBLY - FIGURE 4



OIL PAN and OIL PUMP ASSEMBLY - FIGURE 4

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA070011	**Oil Pump Assembly**	1
2	R058055	**Shaft,** oil pump to distributor	1
3	R022022	**Pin,** dowel - aligning	2
4	7100470	**Stud,** oil pump mounting	1
5	R005022	**Oil Pan,** stamped 8 quart	1
6	30626	**Plug,** oil pan blockoff	1
7	RM0230	**Gasket**, oil pan	1
8	R009097	**Bolt,** oil pan attaching	20
9	98432	**Fitting,** oil pan dipstck	1
10	98466	**Bolt,** dipstick fitting attaching	1
11	23535	**Seal,** oil pan dipstick fitting	1
12	98458	**Dipstick Tube,** (All installations)	2
13	98459	**Dipstick,** oil level (yellow/blue lettering)	1
14	R127015	**Clamp**, dipstck attaching	2
15	98235	**Bolt**, clamp attaching	2
16	RS2180	**Lockwasher**, attaching bolt	2
17	45343	**Seal,** dipstick tube	1

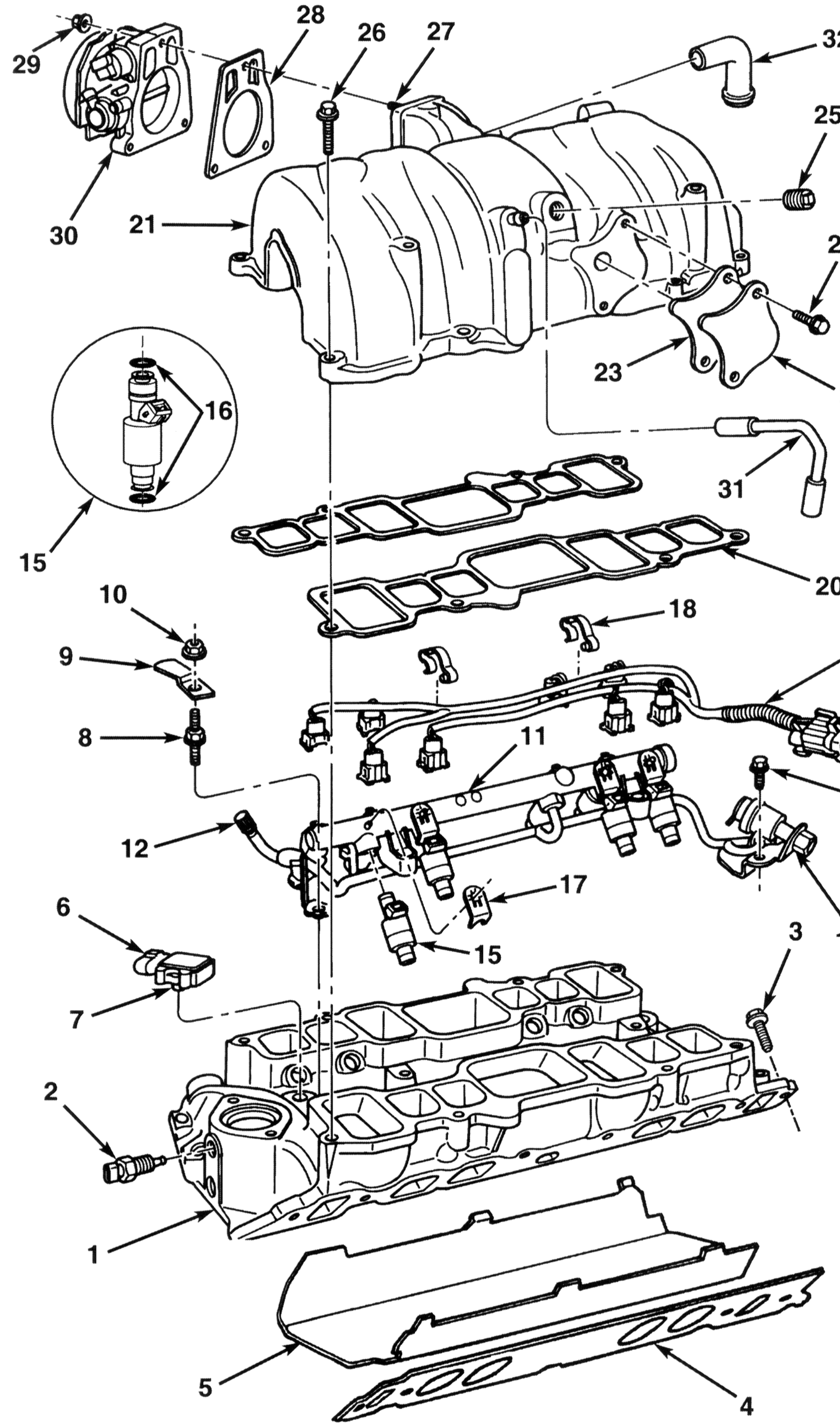
REMOTE OIL FILTER ASSEMBLY - FIGURE 5



REMOTE OIL FILTER ASSEMBLY - FIGURE 5

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98105	**Adapter, remote filter to cylinder block**	1
2	98173	**Valve,** oil pressure relief	1
3	22802	**O-Ring,** adapter to block (Small)	1
4	22654	**O-Ring,** adapter to block (Large)	1
5	90225175	**Bolt,** adapter to cylinder block	2
6	92205000	**Washer**, adapter bolt (Copper)	2
7	18100	**Hose Assembly,** adapter to filter header (40”)	1
8	22897	**O-Ring,** oil line	2
9	R079066	**Oil Filter Header**	1
10	R024203	**Nipple,** header filter adapter	1
11	22679	**Oil Filter Element**	1
12	90205100	**Bolt,** header to bracket	3
13	93200000	**Lockwasher,** header mounting bolt	3
14	95200000	**Nut,** header mounting bolt	3
15	98334	**Bracket,** filter mounting	1
15	98635	**Bracket**, filter mounting (Front mounted closed cooling)	1
16	90405200	**Bolt,** bracket to cylinder head	2
17	93400000	**Lockwasher,** bracket mounting bolt	2
18	98183	**Spacer,** mounting bracket	1
19	18102	**Hose Assembly,** filter header to oil cooler (18”)	1
20	22897	**O-Ring,** oil line	1
21	98123	**Oil Cooler Assembly** (RWC cooling only)	1
21	98570	**OIl Cooler Assembly** (Closed cooling only))	AR
22	R168005	**Zinc,** sacrificial	1
23	18101	**Hose Assembly,** oil cooler to adapter (47”)	1
24	22897	**O-Ring,** oil line	1
25	22121	**Clamp,** oil line mounting	2

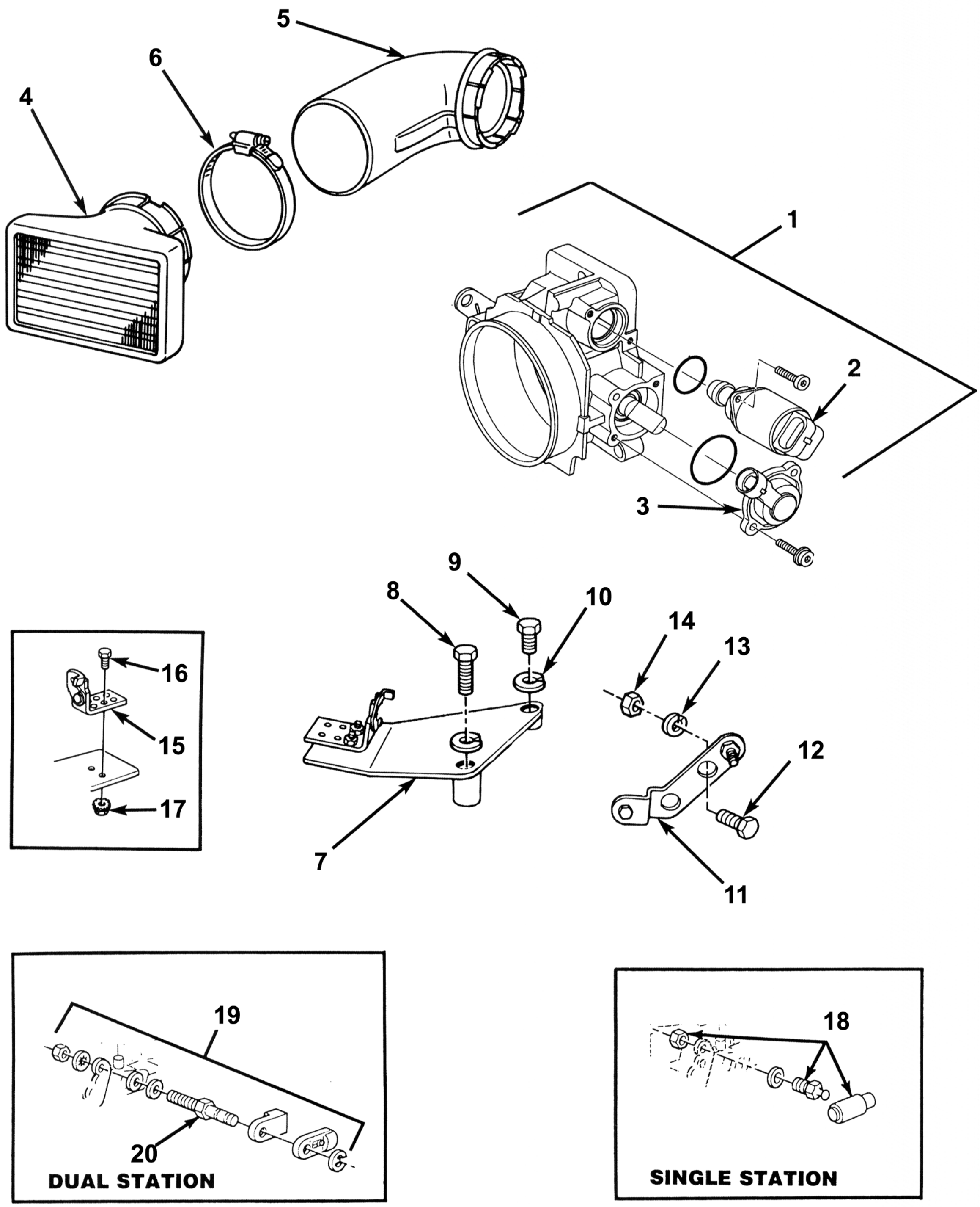
INTAKE MANIFOLD ASSEMBLY - FIGURE 6



INTAKE MANIFOLD ASSEMBLY - FIGURE 6

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	7151280	**Intake Manifold,** lower	1
2	R020019	**Sender,** temperature (CTS)	1
3	7151310	**Bolt,** intake mounting (1-1/4”)	12
4	7151330	**Gasket,** intake manifold H s	1
5	31038	**Guard,** oil splash - lifter	1
6	49050	**Sensor,** MAP	1
7	47310	**Seal,** MAP sensor	1
8	49055	**Stud,** fuel rail retaining	1
9	49054	**Clip,** MAP sensor retaining	1
10	97330010	**Nut,** retaining clip holddown	1
11	49059	**Injector Fuel Rail Assembly**	1
12	49053	**Cap,** test valve	1
13	49056	**Bolt,** fuel rail attaching	1
14	49063	**Fuel Pressure Regulator**	1
15	49051	**Injector Assembly**	8
16	49062	**O-Ring,** kit fuel injector	8
17	49052	**Retainer,** fuel injector to fuel rail	2
18	49058	**Clip,** injector wire harness retaining	1
19	49057	**Wire Harness Assembly**, fuel injectors	
20	7151320	**Gasket,** upper to lower intake manifold	1
21	7151290	**Intake Manifold, Upper**	1
22	7151340	**Cover,** EGR blockoff	1
23	7150540	**Gasket,** EGR blockoff cover	1
24	7142110	**Bolt,** EGR blockoff cover attaching	3
25	RS3551	**Plug,** 3/8” NPT	1
26	7151300	**Bolt,** intake mounting	8
27	49066	**Stud,** throttle body mounting	3
28	RM0251	**Gasket,** throttle body mounting H s	1
29	49027	**Nut,** throttle body mounting	3
30	RA035036	**Throttle Body Assembly**	1
31	49064	**Hose,** PCV connecting	1
32	49065	**Hose,** fresh air inlet	1

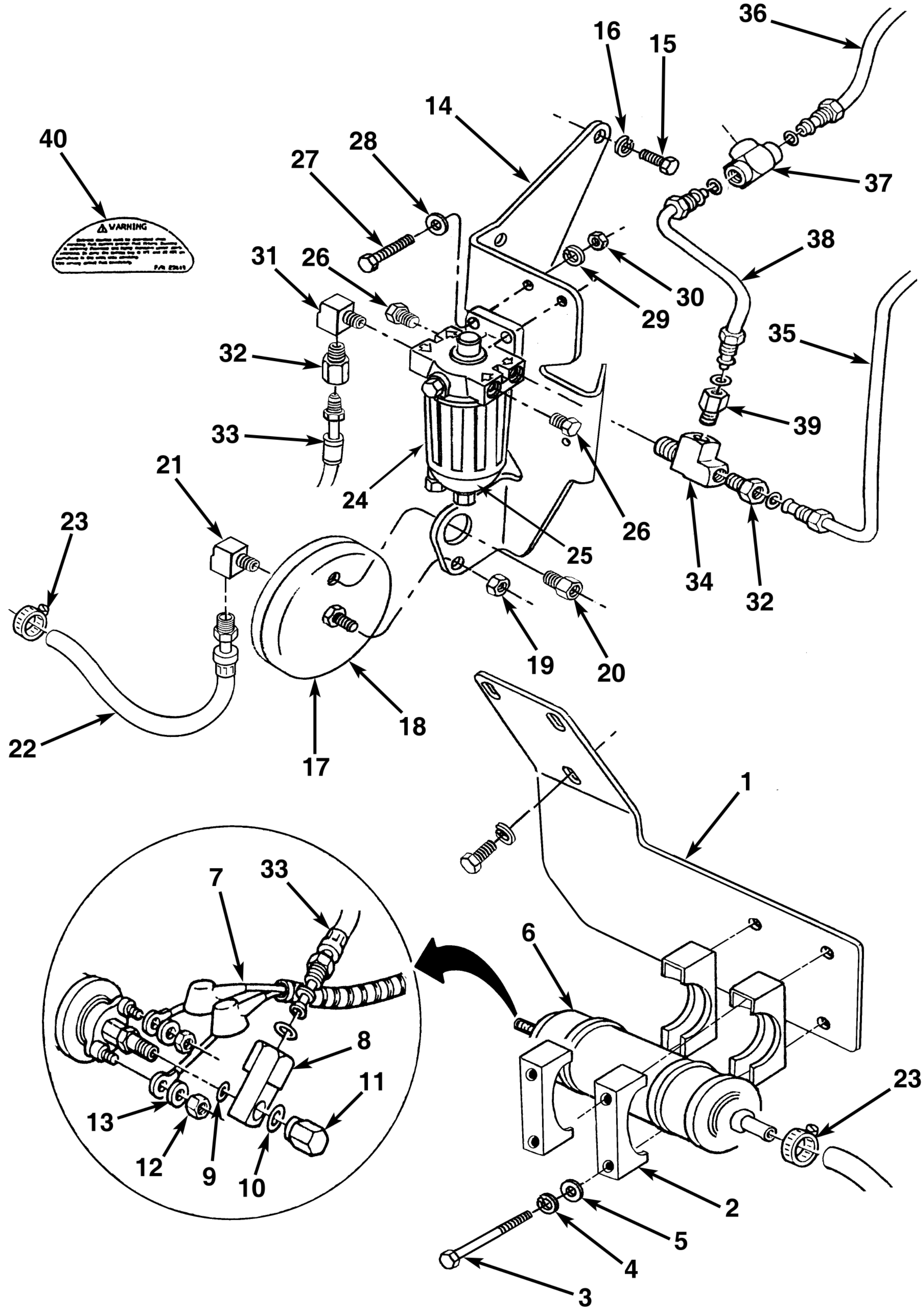
INTAKE MANIFOLD COMPONENTS - FIGURE 7



INTAKE MANIFOLD COMPONENTS - FIGURE 7

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA035036	**Throttle Body Assembly**	1
2	49060	**Idle Air Control Valve (IAC)**	1
3	49061	**Throttle Position Sensor (TPS)**	1
4	49037	**Flame Arrestor,** intake	1
5	98580	**Extension Tube,** air inlet	1
6	23541	**Clamp,** retaining	2
7	98568	**Throttle Bracket,** intake	1
8	90205125	**Bolt,** bracket mounting (Long)	1
9	90205100	**Bolt**, bracket mounting (Short)	1
10	93200000	**Lockwasher,** mounting bolt	2
11	98551	**Throttle Arm,** throttle body	1
12	90124050	**Bolt,** throttle arm retaining	2
13	93100000	**Lockwasher,** retaining bolt	2
14	95100000	**Nut,** retaining bolt	2
15	R090086	**Cable Clip,** throttle attaching (Single)	1
15	22232	**Cable Clip,** throttle attaching (Dual)	AR
16	91000051	**Screw,** clip mounting	2
17	95000060	**Nut**, clip mounting screw	2
18	R178014	**Ball Joint Assembly,** cable attaching (Single)	1
19	23235	**Cable Attaching Kit, Dual**	AR
20	22978	**Pivot Pin,** cable attaching (Dual)	1

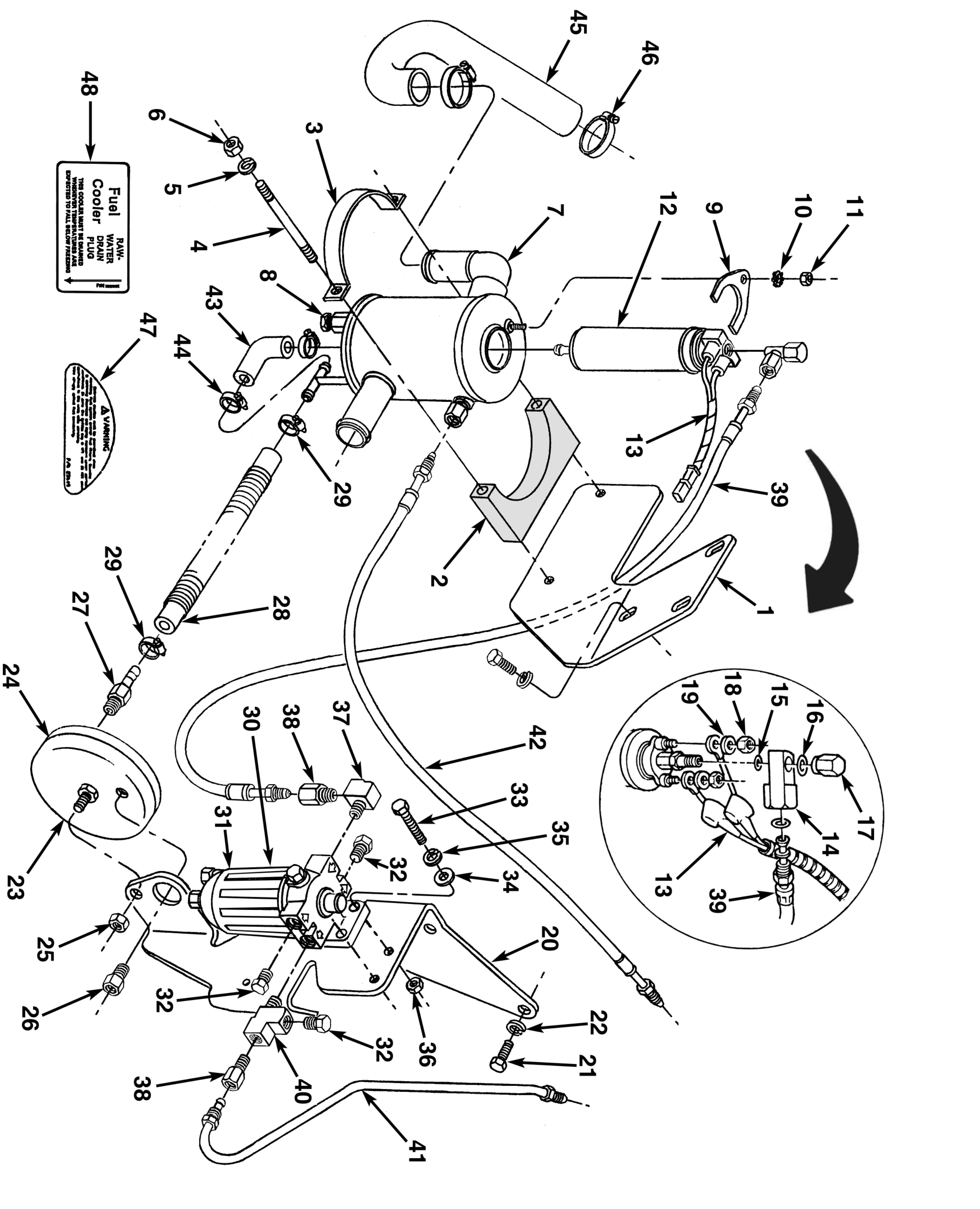
RETURN TYPE FUEL SYSTEM COMPONENTS- FIGURE 8



RETURN TYPE FUEL SYSTEM COMPONENTS- FIGURE 8

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98531	**Bracket**, fuel pump mounting	1
2	98437	**Clamp,** fuel pump retaining	4
3	90205350	**Bolt,** fuel pump mounting	4
4	93200000	**Lockwasher,** mounting bolt	4
5	92200000	**Washer,** mounting bolt	4
6	47039	**Electric Fuel Pump Assembly**	1
7	49038	**Wire Harness,** fuel pump to engine harness	1
8	98440	**Fitting,** fuel line to fuel pump	1
9	23516	**O-Ring,** fuel pump sealing (Large)	1
10	23515	**O-Ring,** fuel pump sealing (Small)	1
11	98442	**Nut,** fitting to fuel pump	1
12	NSS	**Nut,** wire retaining	1
13	NSS	**Lockwasher,** retaining nut	1
14	98553	**Bracket,** filter mounting	1
15	90405100	**Bolt**, bracket to cylinder head attaching	3
16	93400000	**Lockwasher,** attaching bolt	3
17	47038	**Filter,** Fuel inlet	1
18	47061	**Screen,** inlet filter (Not Shown)	1
19	47066	**Nut,** filter to bracket attaching	1
20	R024196	**Fitting**, fuel inlet	1
21	137425	**Elbow,** fuel outlet	1
22	98469	**Fuel Line,** filter to fuel pump	1
23	RS3864	**Clamp,** fuel line to fuel pump	2
24	47046	**Fuel Filter,** Racor water separating	1
25	47047	**Element,** Racor fuel filter (Not Shown)	1
26	RS3552	**Fitting,** blockoff	2
27	90205125	**Bolt,** filter mounting	2
28	92200000	**Washer**, mounting bolt	2
29	93200000	**Lockwasher,** mounting bolt	2
30	95200000	**Nut,** mounting bolt	2
31	80302	**Elbow,** fuel inlet fitting	1
32	30637	**Adapter**, fuel line	2
33	49034	**Fuel Line Assembly,** fuel pump to filter	1
34	98447	**Elbow,** three way fuel fitting	1
35	49032	**Fuel Line Assembly,** filter to fuel rail	1
36	49033	**Fuel Line Assembly,** return from fuel rail	1
37	30620	**Elbow,** fuel return fitting	1
38	49035	**Fuel Line Assembly,** return fitting to filter	1
39	98450	**Adapter**, air bleed	1
40	23649	**Decal,** fuel system warning	1

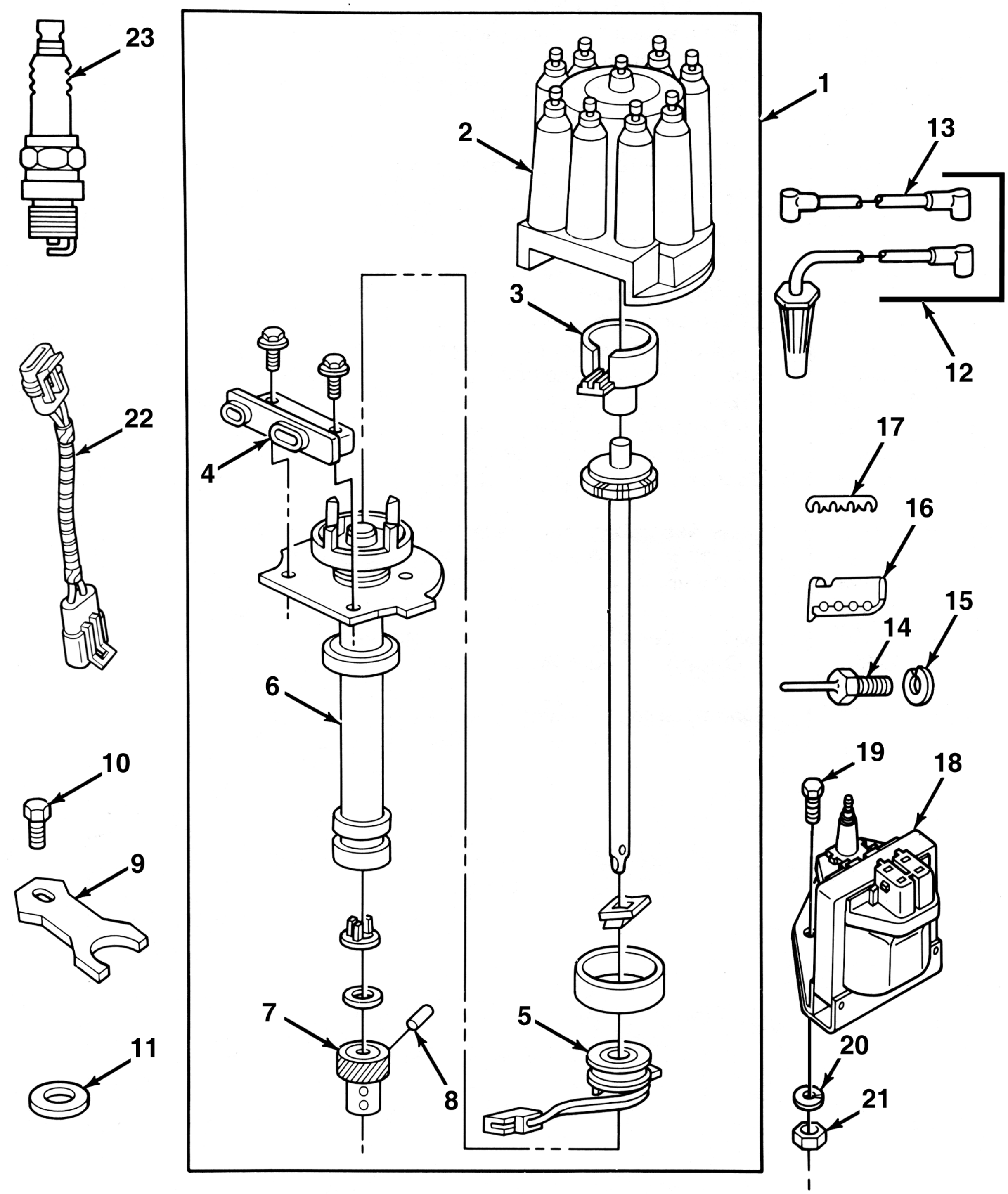
RETURNLESS FUEL SYSTEM COMPONENTS - FIGURE 9



RETURNLESS FUEL SYSTEM COMPONENTS - FIGURE 9

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98596	**Bracket,** fuel cooler mounting	1
2	23554	**Retainer,** fuel cooler rubber	1
3	NSS	**Clamp,** fuel cooler retaining (part of item #2)	1
4	96369	**Stud,** fuel cooler mounting	2
5	93300000	**Lockwasher,** mounting stud	1
6	RS1028	**Nut,** clamp retaining nut	1
7	98597	**Fuel Cooler Assembly**	1
8	RS3552	**Drain Plug**, fuel cooler	1
9	98642	**Retainer,** fuel pump	1
10	TBD	**Star Washer,** retaining nut	1
11	TBD	**Nut,** fuel pump retainer attaching	1
12	47039	**Electric Fuel Pump Assembly**	1
13	49038	**Wire Harness,** fuel pump to engine harness	1
14	98440	**Fitting,** fuel line to fuel pump	1
15	23516	**O-Ring,** fuel pump sealing (Large)	1
16	23515	**O-Ring,** fuel pump sealing (Small)	1
17	98442	**Nut,** fitting to fuel pump	1
18	NSS	**Nut,** wire retaining	1
19	NSS	**Lockwasher,** retaining nut	1
20	98553	**Bracket,** filter mounting	1
21	90405100	**Bolt**, bracket to cylinder head attaching	3
22	93400000	**Lockwasher,** attaching bolt	3
23	47038	**Filter,** Fuel inlet	1
24	47061	**Screen,** inlet filter (Not Shown)	1
25	47066	**Nut,** filter to bracket attaching	1
26	R024196	**Fitting**, fuel inlet	1
27	30636	**Fitting,** fuel outlet	1
28	98431	**Fuel Line,** filter to fuel pump	1
29	RS3864	**Clamp,** fuel line	2
30	47046	**Fuel Filter,** Racor water separating	1
31	47047	**Element,** Racor fuel filter (Not Shown)	1
32	RS3552	**Fitting,** blockoff	3
33	90205125	**Bolt,** filter mounting	2
34	92200000	**Washer**, mounting bolt	2
35	93200000	**Lockwasher,** mounting bolt	2
36	95200000	**Nut,** mounting bolt	2
37	80302	**Elbow,** fuel inlet fitting	1
38	30637	**Adapter,** fuel line	2
39	47116	**Fuel Line Assembly,** fuel pump to filter	1
40	98447	**Elbow,** three way fuel fitting	1
41	49032	**Fuel Line Assembly,** filter to fuel rail	1
42	49076	**Fuel Line Assembly,** from fuel rail to fuel cooler	1
43	49041	**Fuel Line ,** return fitting to fuel pump	1
44	RS3864	Clamp, fuel line	4
45	18388	**Hose, cooler to water pump**	1
46	RS3858	**Clamp**, hose	2
47	23649	**Decal,** fuel system warning	1
48	23645	**Decal,** fuel cooler system warning	1

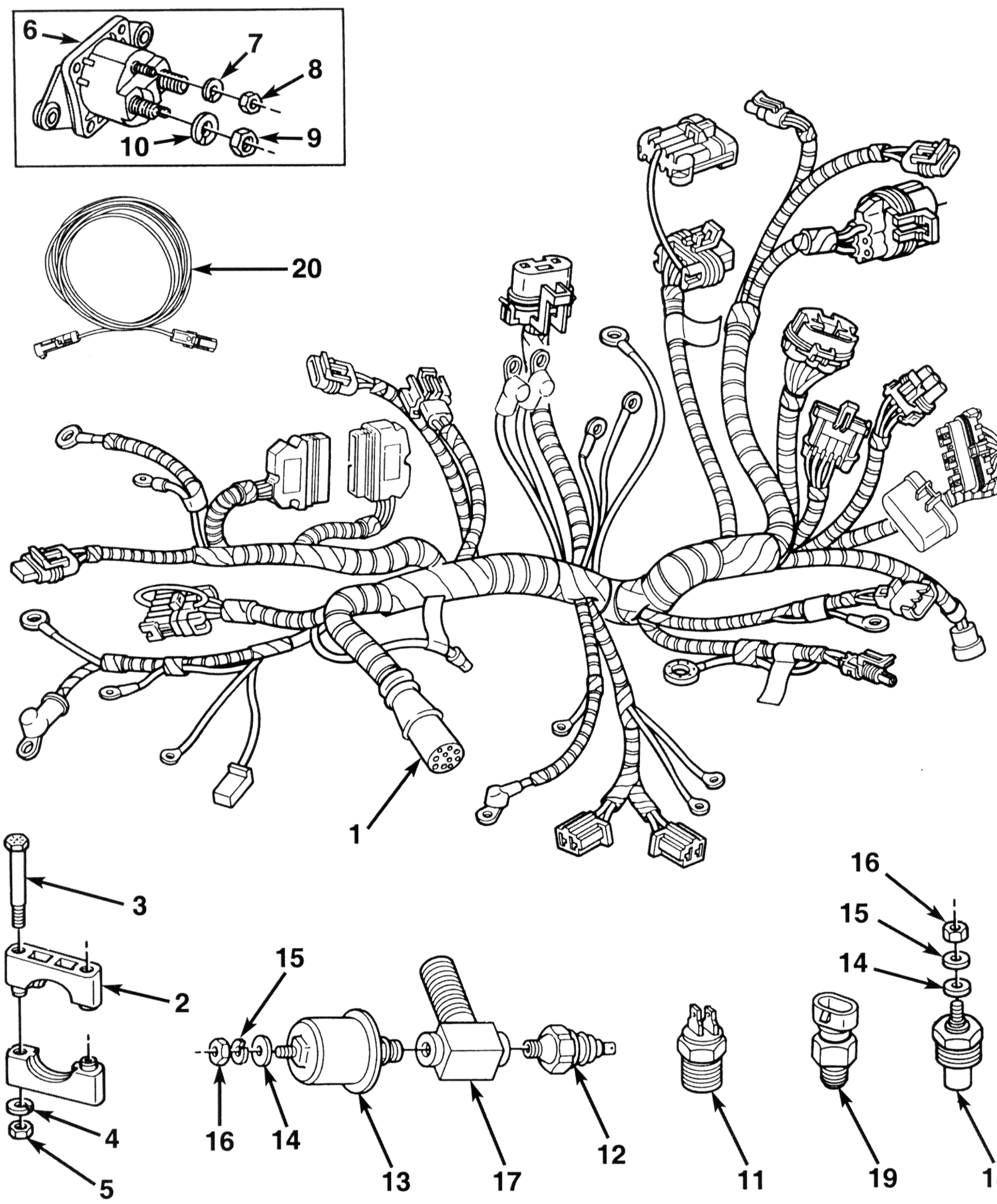
DELCO IGNITION COMPONENTS - FIGURE 10



DELCO IGNITION COMPONENTS - FIGURE 10

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA107039E	**Distributor Assembly**	1
2	RA108006	**Cap,** distributor	1
3	R103008	**Rotor,** ignition	1
4	R116014	**Module,** ignition	1
5	R105003	**Pickup Coil Assembly**	1
6	7243800	**Housing,** distributor	1
7	7243880	**Gear,** drive	1
8	7241200	**Pin,** drive gear	1
9	R126026	**Clamp**, distributor hold-down	1
10	90325088	**Bolt,** distributor clamp	1
11	RM0123	**Gasket,** distributor	1
12	98171	**Spark Plug Wire Set**	1
13	98094	**Coil Wire**	1
14	97663	**Stud, Pin,** retainer mounting (5/8")	1
14	98235	**Stud, Pin,** retainer mounting (1")	1
14	R096144	**Washer / Pin**	1
15	93300000	**Lockwasher,** wire retainer stud	2
16	22222	**Retainer,** spark plug wires	2
17	R127062	**Separator,** spark plug wires	2
18	R117005	**Ignition Coil Assembly**	1
19	90205088	**Bolt,** coil to bracket (7/8")	2
20	9417953	**Lockwasher,** coil mounting bolt	2
21	RS1046	**Nut,** coil mounting bolt	2
22	7241790	**Wire,** coil to distributor	1
23	RP030008	**Spark Plug**	1
23	49078	**Spark Plug** (Platinum)	8

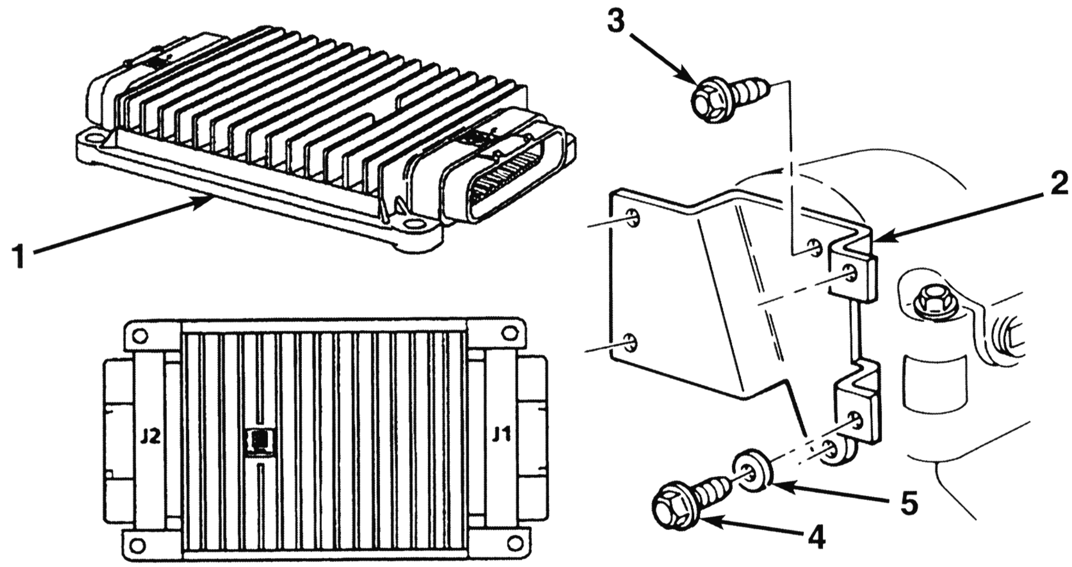
WIRING HARNESS ASSEMBLIES and SENDERS - FIGURE 11



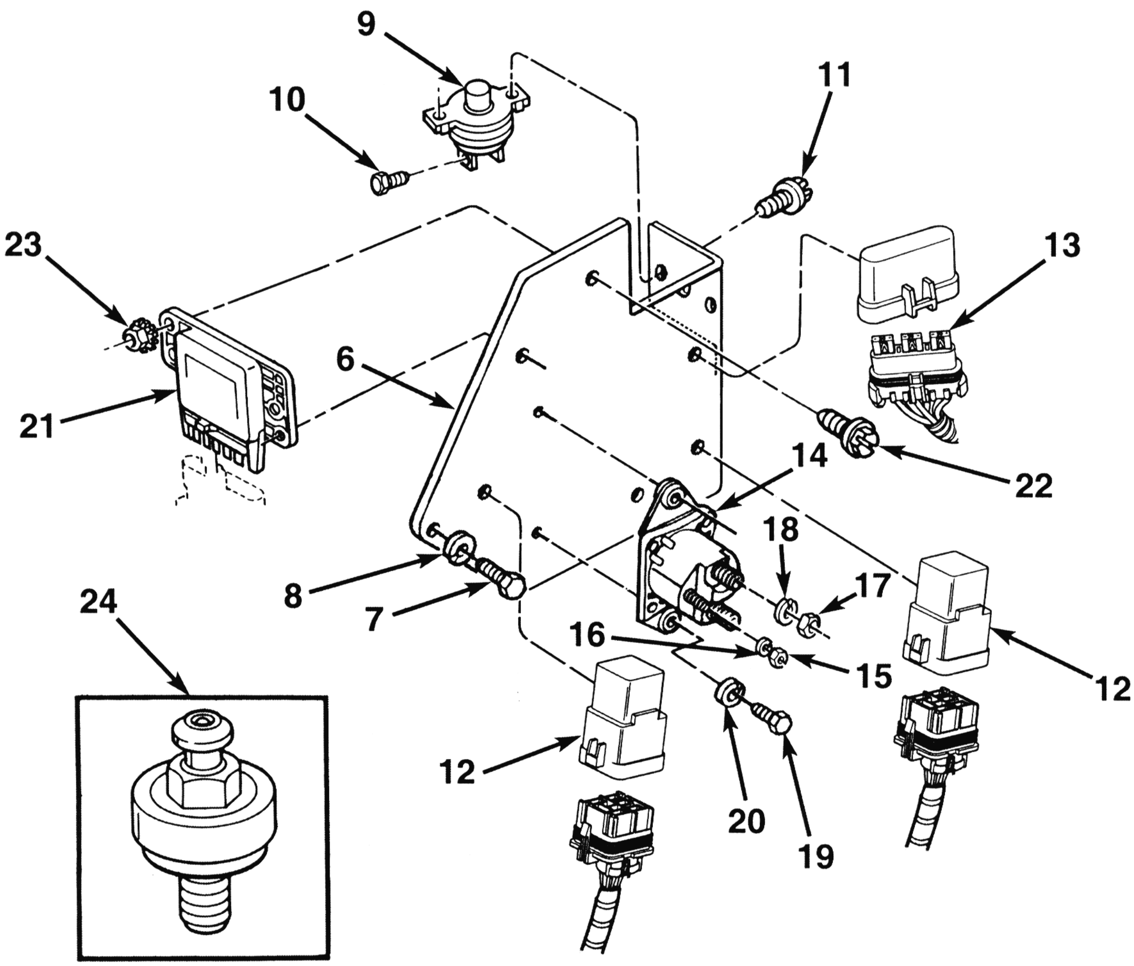
WIRING HARNESS ASSEMBLIES and SENDERS - FIGURE 11

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	49080	**Engine Wire Harness Assembly (MP454XLi)**	1
1	49028	**Engine Wire Harness Assembly (MP7.4L)**	1
2	98266	**Clamp,** main connector mounting	2
3	90105300	**Bolt,** clamp attaching	2
4	92100000	**Lockwasher,** attaching bolt	2
5	95104300	**Nut,** attaching bolt	2
6	R130014	**Solenoid,** starter slave	1
7	95011000	**Nut,** solenoid terminal (#10)	1
8	93003000	**Lockwasher,** solenoid terminal (#10)	1
9	95201000	**Nut,** solenoid terminal (5/16”)	2
10	93203000	**Lockwasher,** solenoid terminal (5/16”)	2
11	R020037	**Switch,** transmission alarm	1
12	R020015A	**Switch,** engine oil pressure alarm	1
13	R020001	**Sender,** oil pressure (SS)	1
13	R020006	**Sender,** oil pressure (DS)	AR
13	22702	**Sender,** oil pressure (SS-VDO)	AR
13	22704	**Sender,** oil pressure (DS-VDO)	AR
14	TBD	**Washer,** sender terminal	1
15	TBD	**Lockwasher**, sender terminal	1
16	95011000	**Nut,** sender terminal	1
17	30612	**Tee,** sender attaching	1
18	R020003	**Sender,** temperature (SS)	1
18	727046	**Sender,** temperature (DS)	AR
18	22701	**Sender,** temperature (SS-VDO)	AR
18	22703	**Sender,** temperature (DS-VDO)	AR
14	TBD	**Washer,** sender terminal	AR
15	TBD	**Lockwasher**, sender terminal	1
16	95011000	**Nut,** sender terminal	1
19	47022	**Sender,** (CTS) coolant temperature switch	1
20	98654	**Harness,** Slave (Twin engine applications only)	1
NI	120322	**Reducer,** VDO sender (Not Shown)	1

EARLY STYLE ECM ASSEMBLIES - FIGURE 12



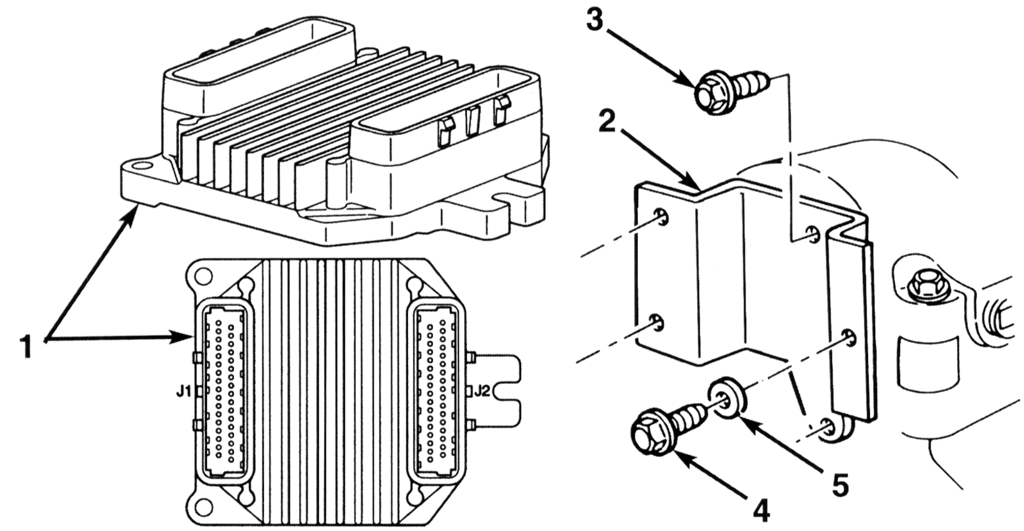
EARLY STYLE ECM ASSEMBLY - 4 BOLT MOUNTING



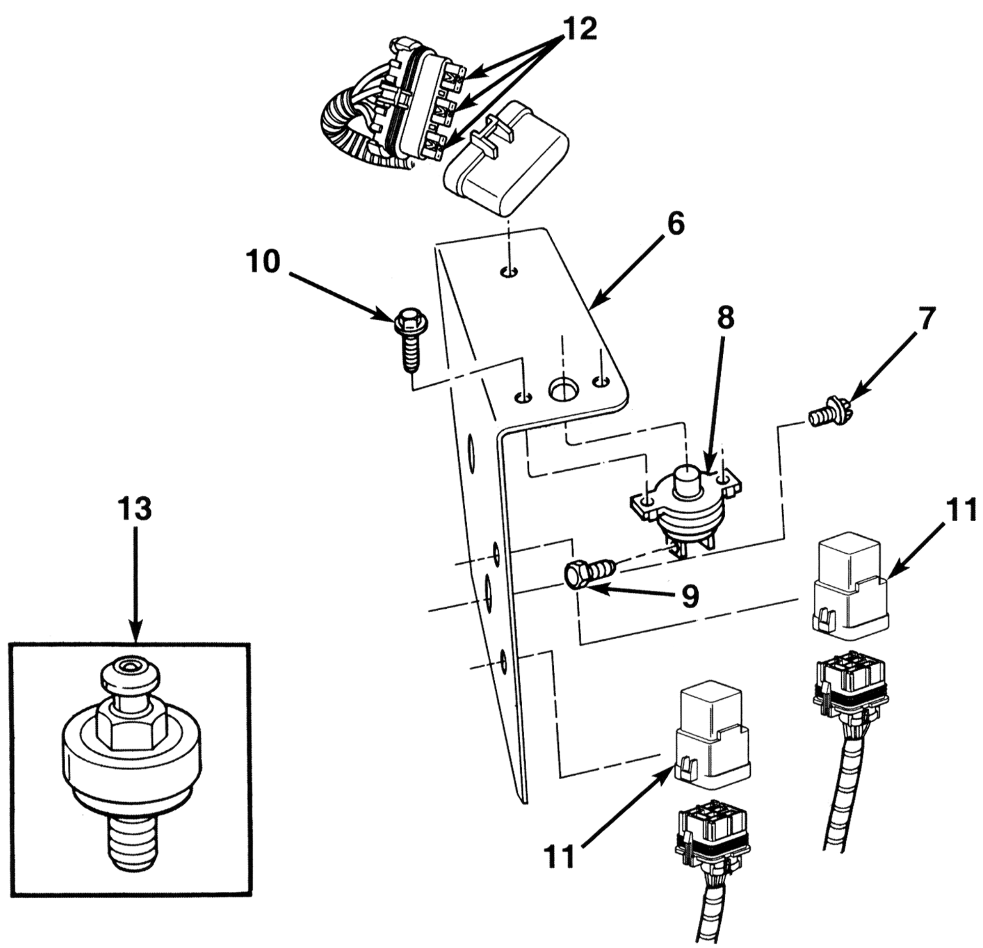
EARLY STYLE ECM ASSEMBLIES - FIGURE 12

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	47056	**Electronic Control Module (ECM)**	1
2	98435	**Bracket,** ECM mounting	1
3	90124050	**Bolt,** bracket to elbow mounting	2
4	90105125	**Bolt,** ECM to mounting bracket	4
5	93100000	**Washer,** mounting bolt	4
6	98535	**Bracket**, component mounting	1
7	90405100	**Bolt,** bracket to cylinder head mounting	3
8	93400000	**Lockwasher,** mounting bolt	3
9	R153006B	**Circuit Breaker Assembly (50 amp)**	1
10	91680025	**Screw,** wire attaching	2
11	91833075	**Bolt,** circuit breaker mounting	2
12	R130012	**Relay Assembly,** fuel pump and ignition	2
13	R153017B	**Fuses, 20 amp**	3
14	R130014	**Solenoid, starter slave**	1
15	95011000	**Nut,** solenoid terminal (#10)	1
16	93003000	**Lockwasher,** solenoid terminal (#10)	1
17	95201000	**Nut,** solenoid terminal (5/16”)	2
18	93203000	**Lockwasher,** solenoid terminal (5/16”)	2
19	RS0251	**Bolt,** slave solenoid mounting	2
20	93100000	**Lockwasher**, mounting bolt	2
21	R116016	**Knock Module**	1
22	90105075	**Bolt,** module attaching	2
23	TBD	**Nut,** module attaching bolt	2
24	49039	**Knock Sensor**	2

LATE STYLE ECM ASSEMBLY - FIGURE 13



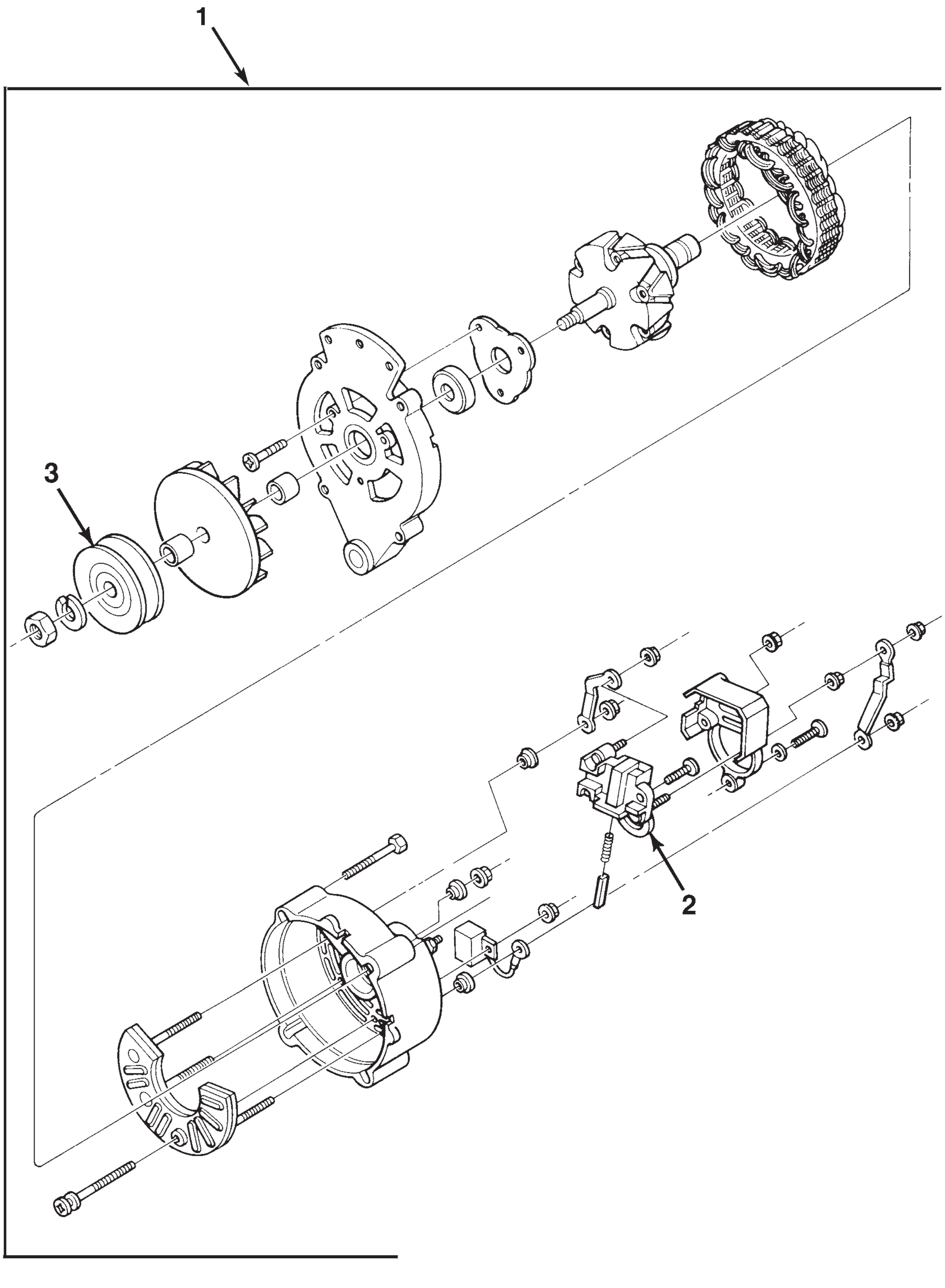
LATE STYLE ECM ASSEMBLY - 3 BOLT MOUNTING



LATE STYLE ECM ASSEMBLY - FIGURE 13

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	47086	**Electronic Control Module (ECM)**	1
2	98616	**Bracket,** ECM mounting	1
3	90124050	**Bolt,** bracket to elbow mounting	2
4	90105125	**Bolt,** ECM to mounting bracket	3
5	93100000	**Washer,** mounting bolt	3
6	98660	**Bracket**, component mounting	1
7	90124050	**Bolt,** bracket to elbow mounting	3
8	R153006B	**Circuit Breaker Assembly (50 amp)**	1
9	91680025	**Screw,** wire attaching	2
10	91833075	**Bolt,** circuit breaker mounting	2
11	R130012	**Relay Assembly,** fuel pump and ignition	2
12	R153017B	**Fuses, 20 amp**	3
13	49039	**Knock Sensor**	2

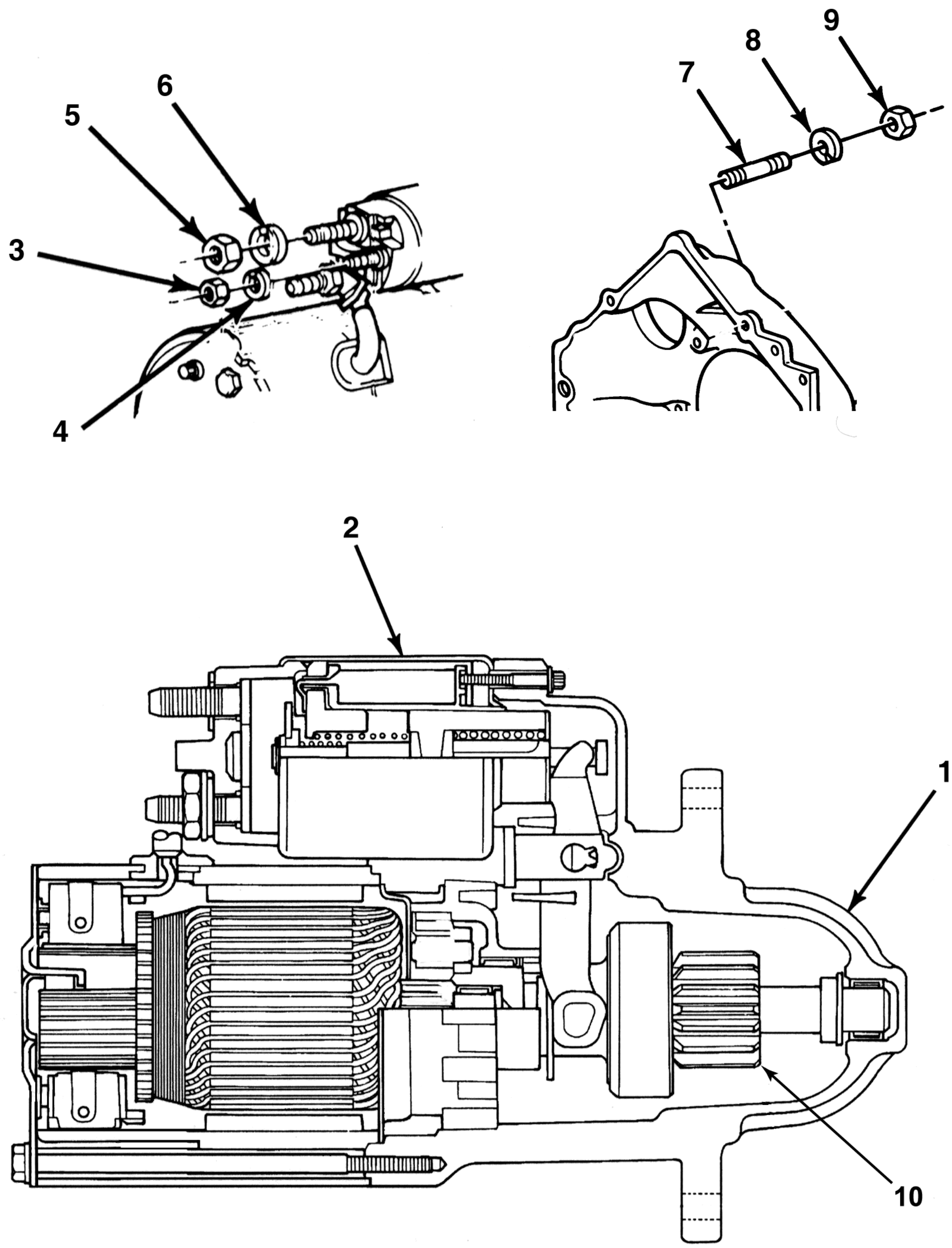
ALTERNATOR ASSEMBLY (MANDO) - FIGURE 14



ALTERNATOR ASSEMBLY (MANDO) - FIGURE 14

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	39200	**Alternator Assembly** (55 AMP)	1
2	39223	**Voltage Regulator Assembly**	1
3	39203	**Pulley,** drive	1
		100 AMP Alternator Assembly **Part Number 39236** This alternator is only serviced as an assembly. Contact your dealer or local alternator rebuilder is service is needed.	

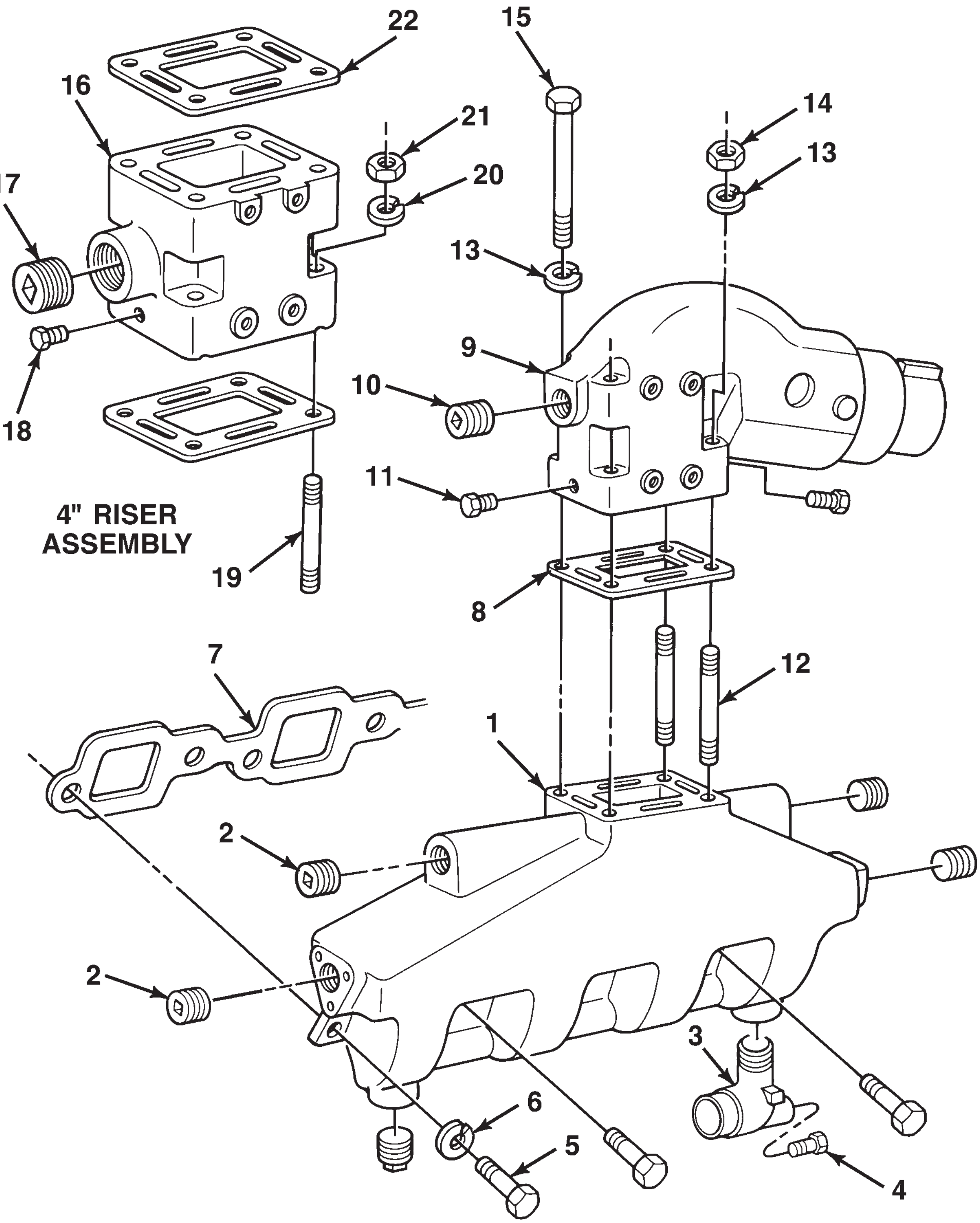
STARTER MOTOR COMPONENTS - FIGURE 15



STARTER MOTOR COMPONENTS - FIGURE 15

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA122009	**Starter Motor Assembly** (starter up position)	1
2	RU0050	**Solenoid,** starter (old style)	1
2	RU0050A	**Solenoid,** starter (new style)	1
3	RS7036	**Nut,** solenoid terminal	1
4	93003000	**Lockwasher,** solenoid terminal	1
5	RS7019	**Nut,** solenoid terminal	1
6	TBD	**Lockwasher,** solenoid terminal	1
7	R031018	**Stud,** starter mounting	2
8	RS2181	**Lockwasher,** starter mounting	2
9	RS1029	**Nut,** starter mounting	2
10	RU0051	**Drive,** starter	1

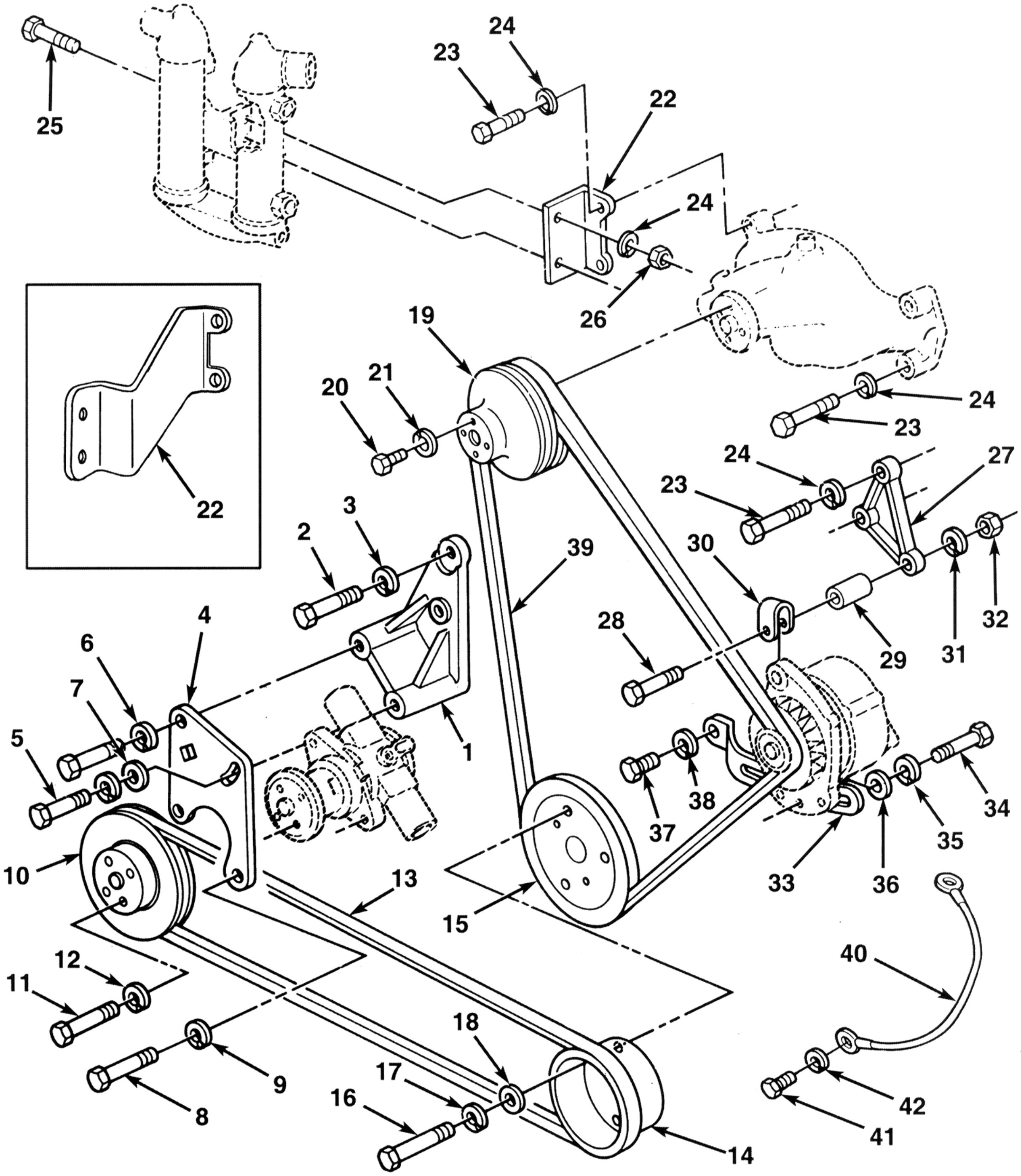
EXHAUST MANIFOLD ASSEMBLY - FIGURE 16



EXHAUST MANIFOLD ASSEMBLY - FIGURE 16

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98125	**Exhaust Manifold**	2
2	103876	**Plug,** exhaust manifold (1")	8
3	30624	**Fitting,** water elbow (900)	2
4	RS3552	**Plug,** drain	2
5	90348150	**Bolt,** manifold to cylinder head (1 -1 /2")	16
6	93300000	**Lockwasher,** manifold to head bolt	16
7	96653	**Gasket,** manifold to cylinder head H s n	2
8	98127	**Gasket,** manifold to exhaust elbow	2
9	98126	**Exhaust Elbow Assembly** (old style)	2
9	R029015	**Exhaust Elbow Assembly** (new style)	2
10	RS3533	**Plug,** exhaust elbow (3/4")	2
11	RS3554	**Plug,** drain	4
12	20827	**Stud,** exhaust elbow attaching (T)	4
13	93300000	**Lockwasher,** elbow attaching stud	8
14	95300000	**Nut**, elbow attaching stud	4
15	90305475	**Bolt,** exhaust elbow attaching (4-3/4")	4
*	22818	**4-Inch Riser Kit**	1
16	98128	**Exhaust Riser**	2
17	RS3533	**Plug,** exhaust riser (3/4")	2
18	RS3554	**Plug,** drain	4
19	20783	**Stud,** riser mounting (2-3/4")	8
20	93300000	**Lockwasher,** riser stud	8
21	95300000	**Nut,** riser mounting stud	8
22	98127	**Gasket,** riser mounting	4
		NOTE: See Fresh Water Cooling section for parts used on Fresh Water Cooled engines.	

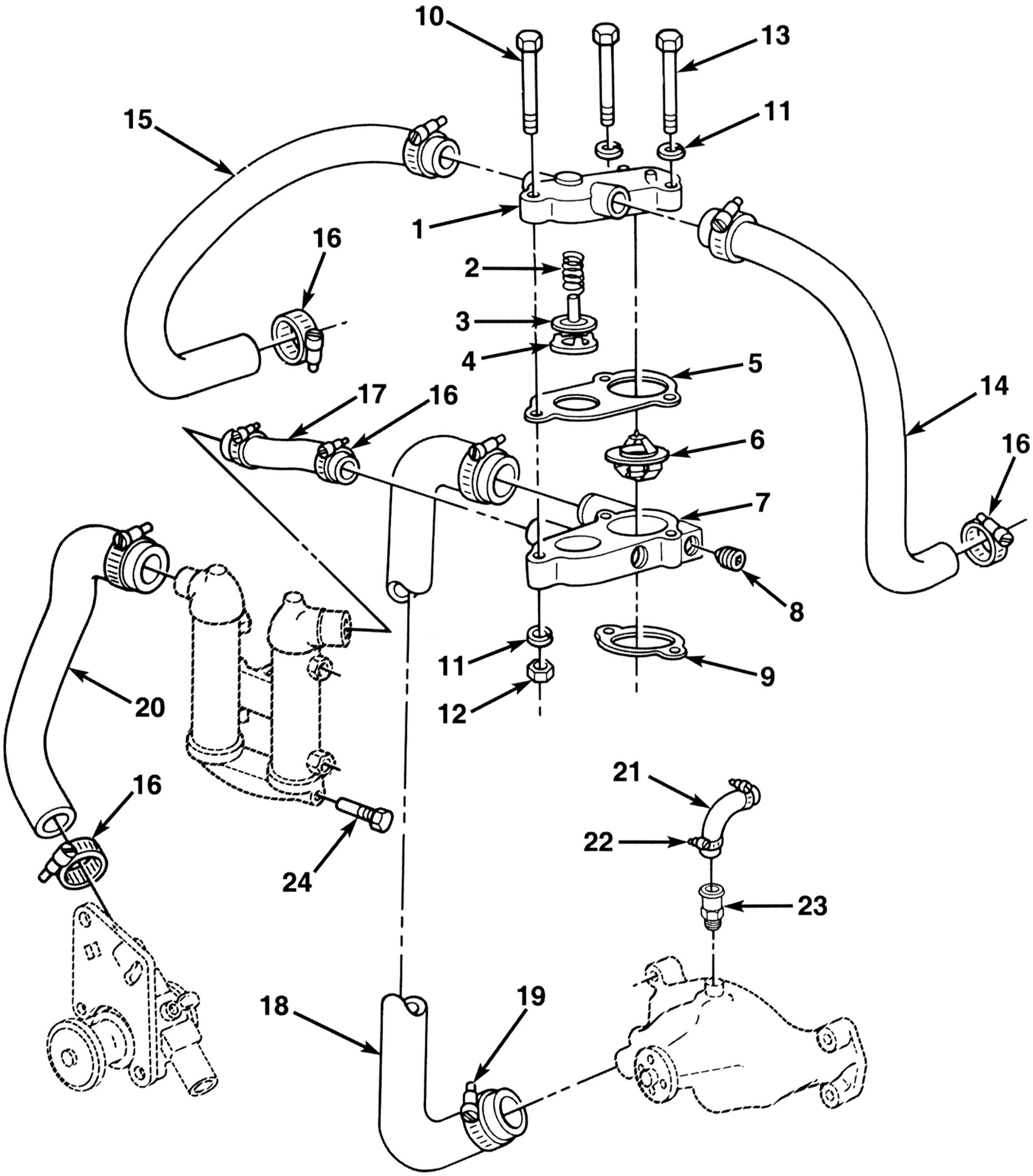
ACCESSORY DRIVE SYSTEM COMPONENTS - FIGURE 17



ACCESSORY DRIVE SYSTEM COMPONENTS - FIGURE 17

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98120	**Bracket**, raw water pump mounting	1
2	90405125	**Bolt,** bracket to cylinder block (1-1/4”)	2
3	93400000	**Lockwasher**, mounting bolt	2
4	98121	**Bracket**, raw water pump adjusting	
5	90405125	**Bolt,** adjusting bracket mounting (1-1/4”)	2
6	93400000	**Lockwasher,** adjusting bolt	2
7	92400000	**Washer**, adjusting bolt	1
8	90204100	**Bolt**, raw water pump mounting (1/2”)	2
9	93200000	**Lockwasher,** pump mounting bolt	2
10	R065047	**Pulley,** raw water pump	1
11	90215075	**Bolt**, pulley attaching (3/4”)	4
12	93200000	**Lockwasher**, attaching bolt	4
13	10258	**Belt**, raw water drive	1
14	97950	**Pulley**, crankshaft to raw water pump	1
15	97954	**Pulley**, crankshaft to alternator	1
16	90315175	**Bolt**, pulley to balancer (1-3/4”)	3
17	93300000	**Lockwasher**, pulley attaching bolt	3
18	92300000	**Washer,** pulley attaching bolt	3
19	R065049	**Pulley**, engine circulating pump	1
20	90215075	**Bolt,** water pump pulley (3/4”)	4
21	93200000	**Lockwasher,** water pump pulley bolt	4
22	97937	**Bracket**, oil cooler mounting	1
22	98637	**Bracket,** oil cooler mounting (front mounted FWC only)	1
23	90405200	**Bolt,** attaching (2”)	5
24	93400000	**Lockwasher**, attaching bolt	7
25	90305100	**Bolt**, oil cooler mounting (1”)	2
26	95300000	**Nut,** cooler mounting bolt	2
27	98333	**Bracket,** alternator mounting	1
28	90505325	**Bolt,** alternator attaching (3-1/4”) **(55 amp)**	1
28	TBD	**Bolt,** alternator attaching (3-1/4”) **(100 amp)**	1
29	98515	**Spacer**, alternator mounting **(100 amp only)**	1
30	98184	**Loop**, alternator adjusting	1
31	93500000	**Lockwasher,** attaching bolt	1
32	95500000	**Nut,** attaching bolt	1
33	98209	**Strap,** alternator adjusting **(55 amp)**	1
33	98519	**Strap,** alternator adjusting **(100 amp)**	1
34	90205100	**Bolt,** alternator adjusting (1”)	1
35	93200000	**Lockwasher**, alternator adjusting bolt	1
36	92200020	**Washer**, alternator adjusting bolt	1
37	90405100	**Bolt,** adjusting strap to block (1”)	1
38	93400000	**Lockwasher**, adjusting strap bolt	1
39	98210	**Belt,** alternator drive	1
40	98391	**Cable,** alternator grounding **(100 amp only)**	1
41	90205063	**Bolt**, cable attaching **(100 amp only)**	1
42	93200000	**Lockwasher**, attaching bolt **(100 amp only)**	1

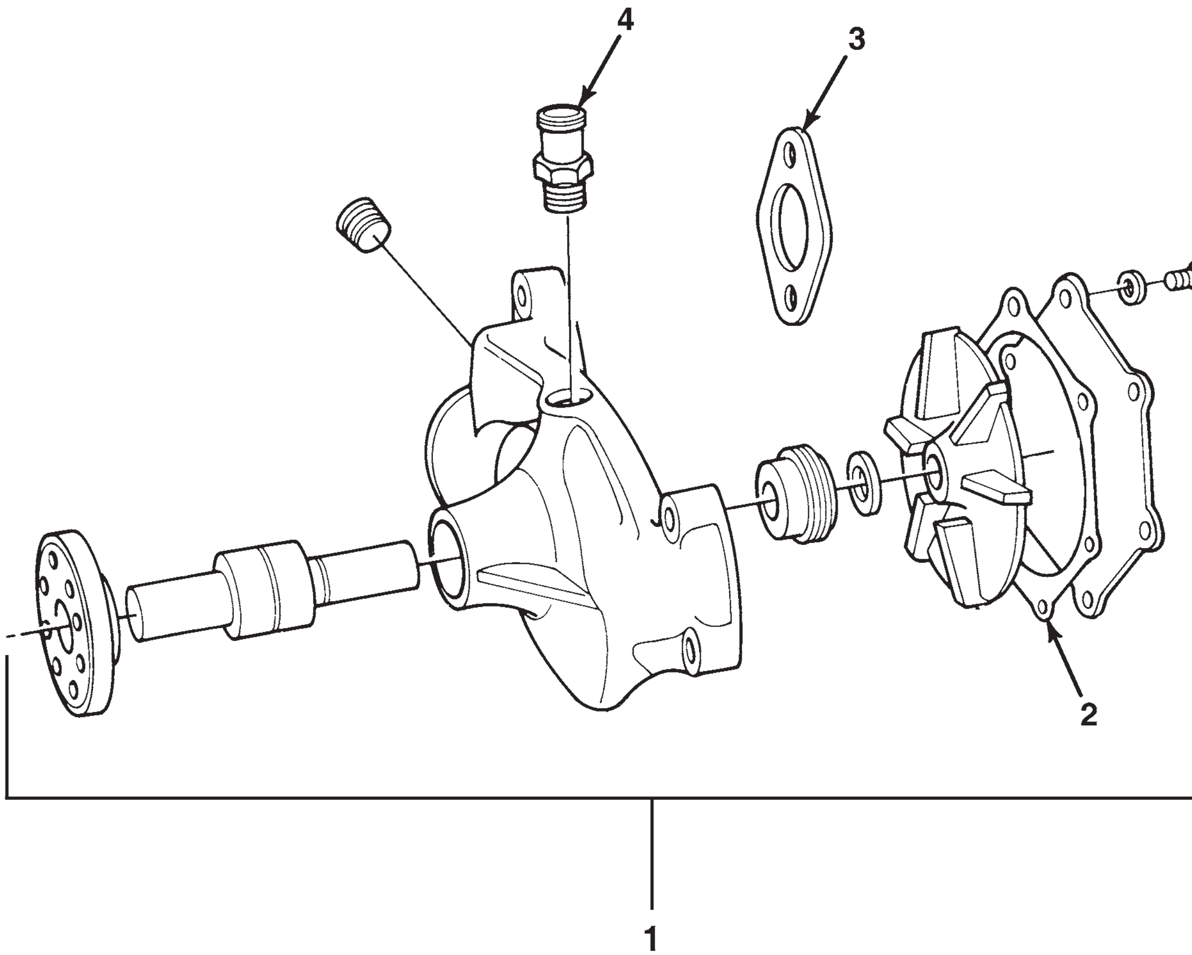
RAW WATER COOLING COMPONENTS - FIGURE 18



RAW WATER COOLING COMPONENTS - FIGURE 18

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
*	22366	**Thermostat Housing Assembly,** Complete	1
1	97556	**Thermostat Housing**, upper	1
2	96686	**Spring**, pressure relief	1
3	96066	**Valve**, pressure relief	1
4	96065	**Seat**, pressure relief	1
5	97361	**Gasket**, thermostat housing	1
6	R026002E	**Thermostat** (143-degree)	1
7	98552	**Thermostat Housing,** lower	1
8	444705	**Plug**, thermostat housing	1
9	RM0121	**Gasket,** thermostat housing	1
10	90305350	**Bolt**, thermostat housing (3-1/2”)	1
11	93300000	**Lockwasher**, thermostat housing bolt	3
12	95300000	**Nut,** thermostat housing bolt	1
13	90305400	**Bolt**, thermostat housing to intake (4”)	2
14	18327	**Hose**, thermostat housing to LH manifold	1
15	18317	**Hose**, thermostat housing to RH manifold	1
16	RS3858	**Clamp,** water hose	8
17	97861	**Hose,** oil cooler to thermostat housing	1
18	18302	**Hose**, water pump to thermostat housing	1
19	RS3855	**Clamp**, hose	2
20	18300	**Hose,** water pump to oil cooler	1
21	R045116	**Hose**, block water bypass	1
22	RS3854	**Clamp**, bypass hose	2
23	7140280	**Fitting**, water pump bypass	2
24	R168005	**Zinc,** sacrificial	1

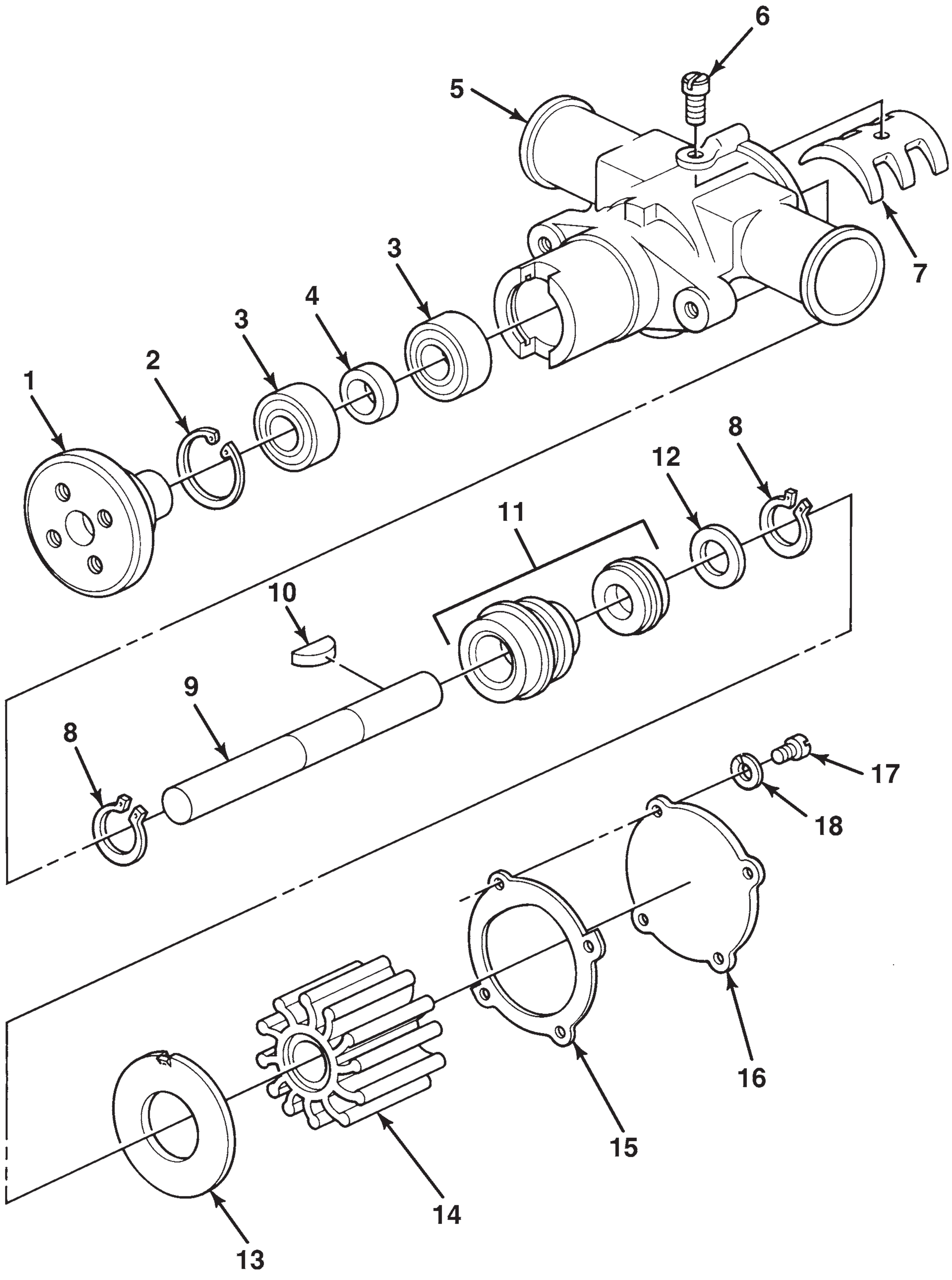
ENGINE WATER CIRCULATING PUMP - FIGURE 19



ENGINE WATER CIRCULATING PUMP - FIGURE 19

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA057019	**Water Pump Assembly**	1
2	96774	**Gasket,** impeller housing cover	1
3	RM0204	**Gasket,** water pump to cylinder block H	2
4	7140280	**Fitting,** water bypass hose	1

RAW WATER COOLING PUMP - FIGURE 20



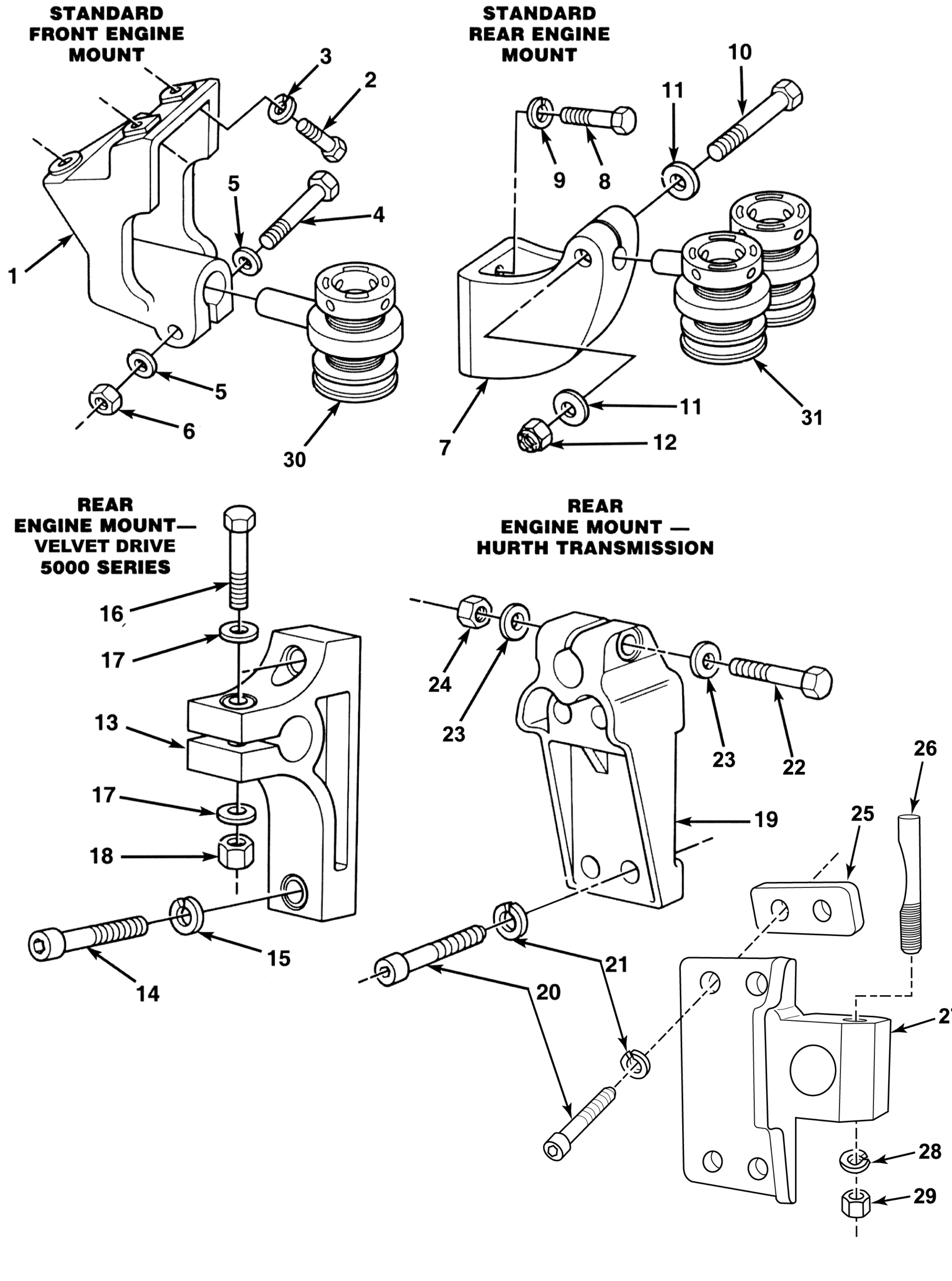
RAW WATER COOLING PUMP - FIGURE 20

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
*	RA057031	**Raw Water Pump Assembly**	1
1	97176	**Hub,** drive	1
2	R048070	**Retainer,** bearing	1
3	40054	**Bearing,** shaft	2
4	R062030	**Spacer,** bearing	1
5	40062	**Housing,** water pump	1
6	R175042	**Screw,** cam retaining	1
7	R161014	**Cam,** eccentric	1
8	R048069	**Retainer,** shaft	2
9	40061	**Shaft Assembly**	1
10	R164014	**Key,** impeller drive	1
11	RK047112	**Seal and Seat Assembly**	1
12	40052	**Washer**	1
13	40063	**Plate,** wear	1
14	R061017	**Impeller,** water pump	1
15	RM0269	**Gasket,** rear cover	1
16	40060	**Cover**	1
17	40071	**Bolt,** rear cover attaching	4
18	40051	**Lockwasher,** cover bolt	4

Repair Kits:

Kit Part No.	Description
40065	**Impeller Kit** (Includes items 14 and 15)
40064	**Overhaul Kit, Major** (includes items 2, 3, 11, 14 and 15)

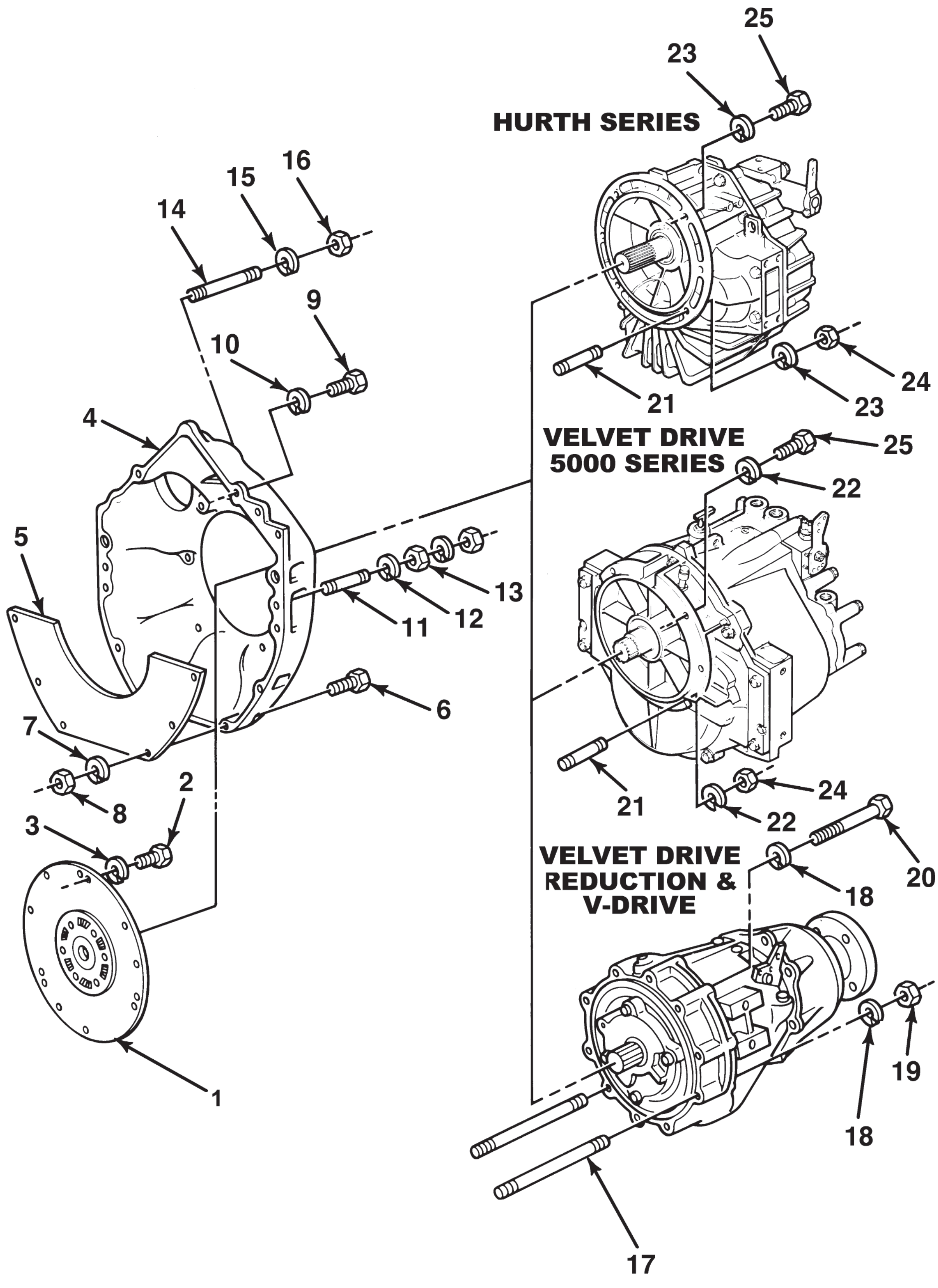
ENGINE and TRANSMISSION MOUNTS - FIGURE 21



ENGINE and TRANSMISSION MOUNTS - FIGURE 21

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
		****Standard Front Engine Mount****	
1	97938	**Bracket**, engine mounting (front)	2
2	99443030	**Bolt**, socket head (30 mm)	4
2	98446030	**Bolt**, hex head (30 mm)	2
3	93940000	**Lockwasher**, bracket mounting bolt	6
4	90318225	**Bolt**, trunnion shaft (2 1/4”)	2
5	92300000	**Washer**, trunnion bolt	4
6	95310300	**Nut**, trunnion bolt - locking	2
		****Standard Rear Engine Mount****	
7	97917	**Bracket**, engine mounting (Rear)	2
8	90405125	**Bolt**, bracket to transmission (1 1/4”)	4
9	93400000	**Lockwasher**, bracket mounting bolt	4
10	90318325	**Bolt**, trunnion shaft (3 1/4”)	2
11	92300000	**Washer**, trunnion bolt	4
12	95310300	**Nut**, trunnion bolt - locking	2
		****Rear Engine Mount - Velvet Drive 5000 Series****	
13	98224	**Bracket**, transmission mounting (Starboard)	1
13	98225	**Bracket**, transmission mounting (Port)	1
14	99559060	**Bolt**, bracket to transmission (12 mm x 60 mm)	4
15	93950030	**Lockwasher** (12 mm)	4
16	90318325	**Bolt**, trunnion shaft (3 1/4”)	2
17	92300000	**Washer**, trunnion bolt	4
18	95310300	**Nut**, trunnion bolt - locking	2
		****Rear Engine Mount - Hurth Transmission****	
19	98077	**Bracket**, engine mounting (rear)	2
20	98553035	**Bolt**, bracket to transmission (12 mm x 35 mm)	4
20	99559060	**Bolt**, bracket to transmission (12 mm x 60 mm)	4
21	93950000	**Lockwasher** (12 mm)	8
22	90318325	**Bolt**, trunnion shaft (3 1/4”)	2
23	92300000	**Washer**, trunnion bolt	4
24	95310300	**Nut**, trunnion bolt - locking	2
25	R109049	**Spacer**, bracket to transmission	2
26	R095020	**Bolt**, trunnion shaft	2
27	R090217	**Bracket**, engine mounting (port)	1
27	R090218	**Bracket**, engine mounting (starboard)	1
28	RS2181	**Lockwasher**, trunnion bolt	2
29	RS1529	**Nut**, trunnion bolt - locking	2
		****Mount Supports****	
30	97926	**Mount**, engine support (single front)	2
31	97905	**Mount**, engine support (dual rear)	2

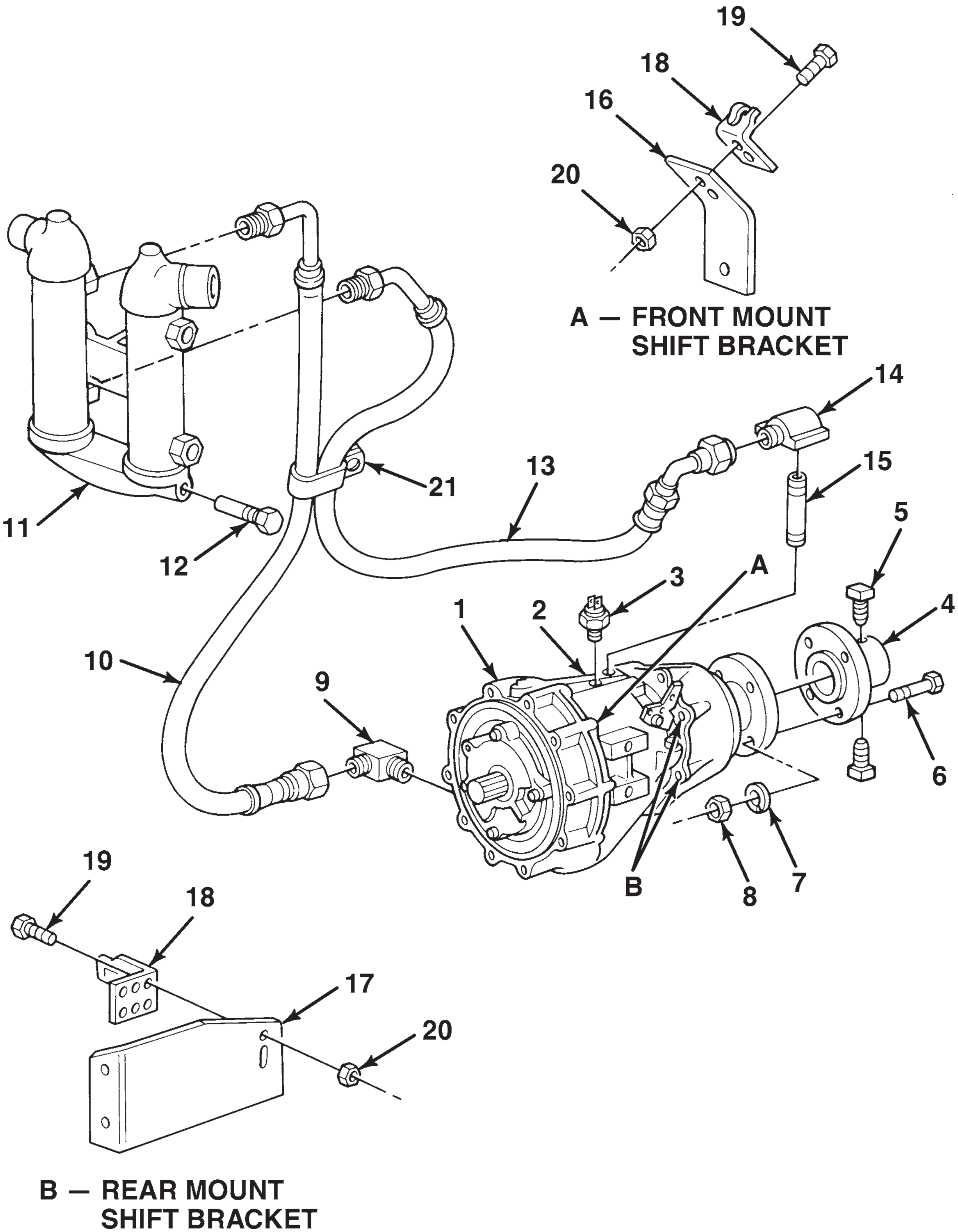
BELL HOUSING ASSEMBLY - FIGURE 22



BELL HOUSING ASSEMBLY - FIGURE 22

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98298	**Drive Damper Assembly** (Hurth and 5000 series only)	1
1	97334	**Drive Damper Assembly** (Standard Velvet Drive)	1
2	R009092	**Bolt,** damper to flywheel (1”)	6
3	RS2180	**Lockwasher,** damper bolt	6
4	98430	**Bellhousing,** flywheel	1
5	98015	**Cover,** bellhousing	1
6	90105125	**Bolt,** cover to bellhousing (1-1/4")	6
7	93100000	**Lockwasher,** cover bolt	6
8	95100000	**Nut,** cover bolt	6
9	90305125	**Bolt,** bellhousing to block (1-1/4")	2
10	93300000	**Lockwasher,** bellhousing bolt	2
11	22455	**Stud,** bellhousing mounting (2-3/4")	2
12	93300000	**Lockwasher,** mounting stud	4
13	95300000	**Nut,** mounting stud	4
14	R031018	**Stud,** starter mounting (1-5/8")	2
15	93400000	**Lockwasher,** starter mounting stud	2
16	95400001	**Nut,** starter mounting stud	2
		**** Velvet Drive Reduction & "V"-Drive ****	
17	96541	**Stud,** transmission mounting (4")	2
18	93400200	**Lockwasher,** transmission mounting	6
19	95300000	**Nut,** transmission mounting stud	2
20	90405350	**Bolt,** transmission mounting	4
		**** Velvet Drive 5000 & Hurth Gears ****	
21	R031018	**Stud,** transmission mounting (1-5/8")	2
22	93400000	**Lockwasher,** transmission mounting	6
23	93400200	**Lockwasher,** transmission mounting	6
24	95400001	**Nut,** transmission mounting stud	2
25	90405125	**Bolt,** transmission mounting	4

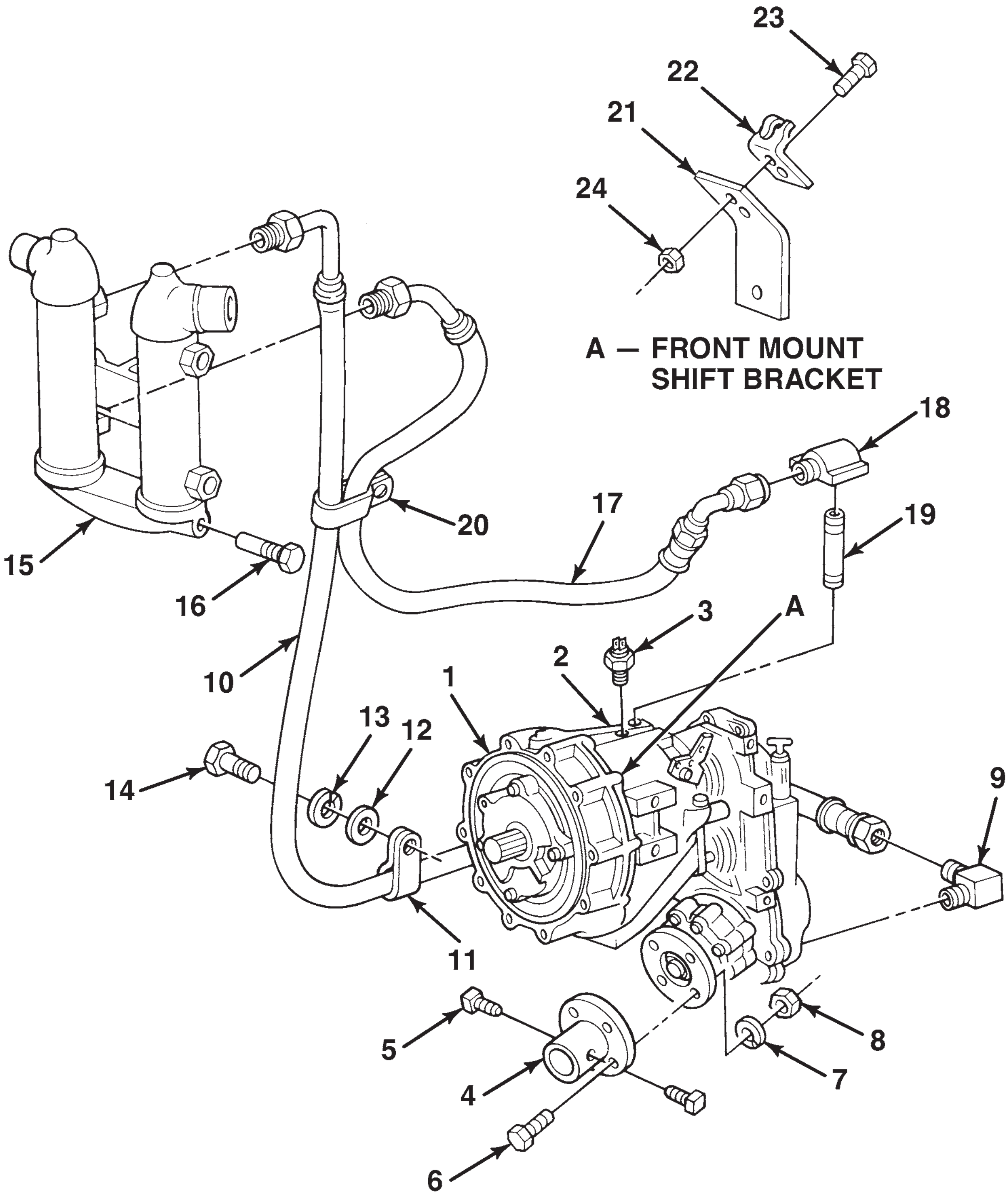
TRANSMISSION AND RELATED COMPONENTS (VELVET DRIVE IN-LINE) - FIGURE 23



TRANSMISSION AND RELATED COMPONENTS (VELVET DRIVE IN-LINE) - FIGURE 23

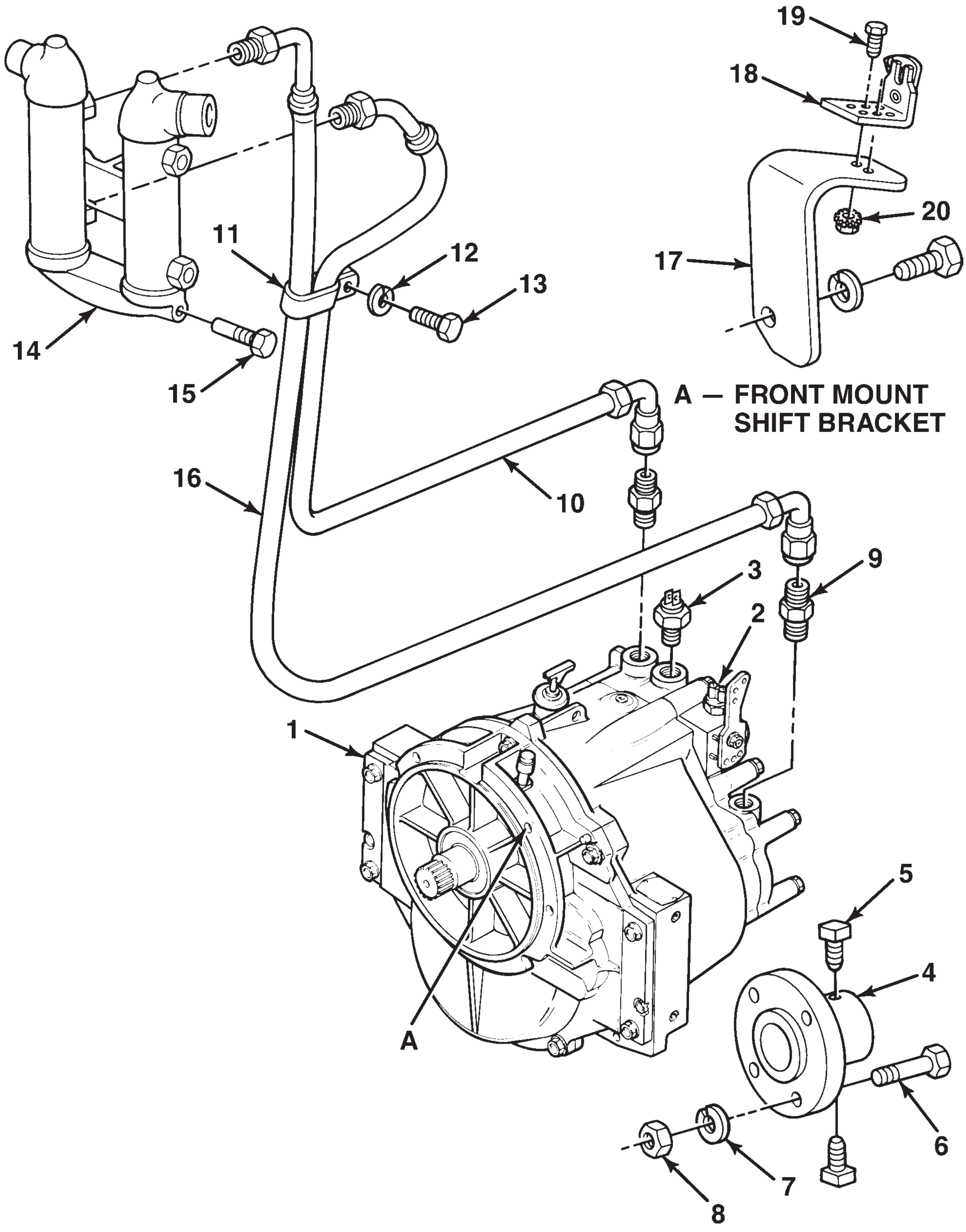
ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA157003	**Transmission** (1:1 Direct Drive)	1
1	RA157004	**Transmission** (1.52:1 Reduction)	1
1	RA157004A	**Transmission** (1.88:1 Reduction)	1
1	RA157004D	**Transmission** (2.57:1 Reduction)	1
1	RA157004E	**Transmission** (2.91:1 Reduction)	1
2	R153002	**Switch Kit,** neutral start	1
2A	25542	**Switch & O-Ring Assembly** (Not Shown)	1
3	R020037	**Sender,** temperature alarm	1
4	R148001	**Coupler,** prop shaft (1" shaft)	OPT
4	R148002	**Coupler,** prop shaft (1-1/8" shaft)	OPT
4	R148003	**Coupler,** prop shaft (1-1/4" shaft)	OPT
4	R148004	**Coupler,** prop shaft (1-3/8" shaft)	OPT
4	R148005	**Coupler,** prop shaft (1-1/2" shaft)	OPT
4	R148007	**Coupler,** prop shaft (1-3/4" shaft)	OPT
4	R148008	**Coupler,** prop shaft (2" shaft)	OPT
5	2000090	**Screw,** set – coupler	2
6	22136	**Bolt,** coupling (1-1/2")	4
7	93400000	**Lockwasher,** coupling bolt	4
8	95410201	**Nut,** coupling bolt	4
9	R024010	**Elbow,** hose – transmission (90-degree)	1
10	18200	**Hose Assembly,** transmission to cooler (45")	1
11	98123	**Oil Cooler Assembly** (RWC only)	1
11	98570	**Oil Cooler Assembly** (FWC only)	1
12	R168005	**Zinc,** sacrificial	1
13	18201	**Hose Assembly,** transmission to cooler (46")	1
14	R024008	**Elbow,** hose – transmission (90-degree)	1
15	RS4674	**Nipple**, pipe (3")	1
16	96341	**Shift Bracket** (Front Entry)	1
17	97471	**Shift Bracket** (Rear Entry)	OPT
18	R090086	**Cable Clip,** single cable	1
18A	22232	**Cable Clip,** dual cable kit	OPT
19	91000050	**Bolt,** clip attaching (1/2")	2
20	95000060	**Nut,** attaching bolt	2
21	22112	**Clamp,** oil hose mounting	2

TRANSMISSION AND RELATED COMPONENTS (VELVET DRIVE “V”-DRIVE) - FIGURE 24



TRANSMISSION AND RELATED COMPONENTS (VELVET DRIVE "V"-DRIVE) - FIGURE 24

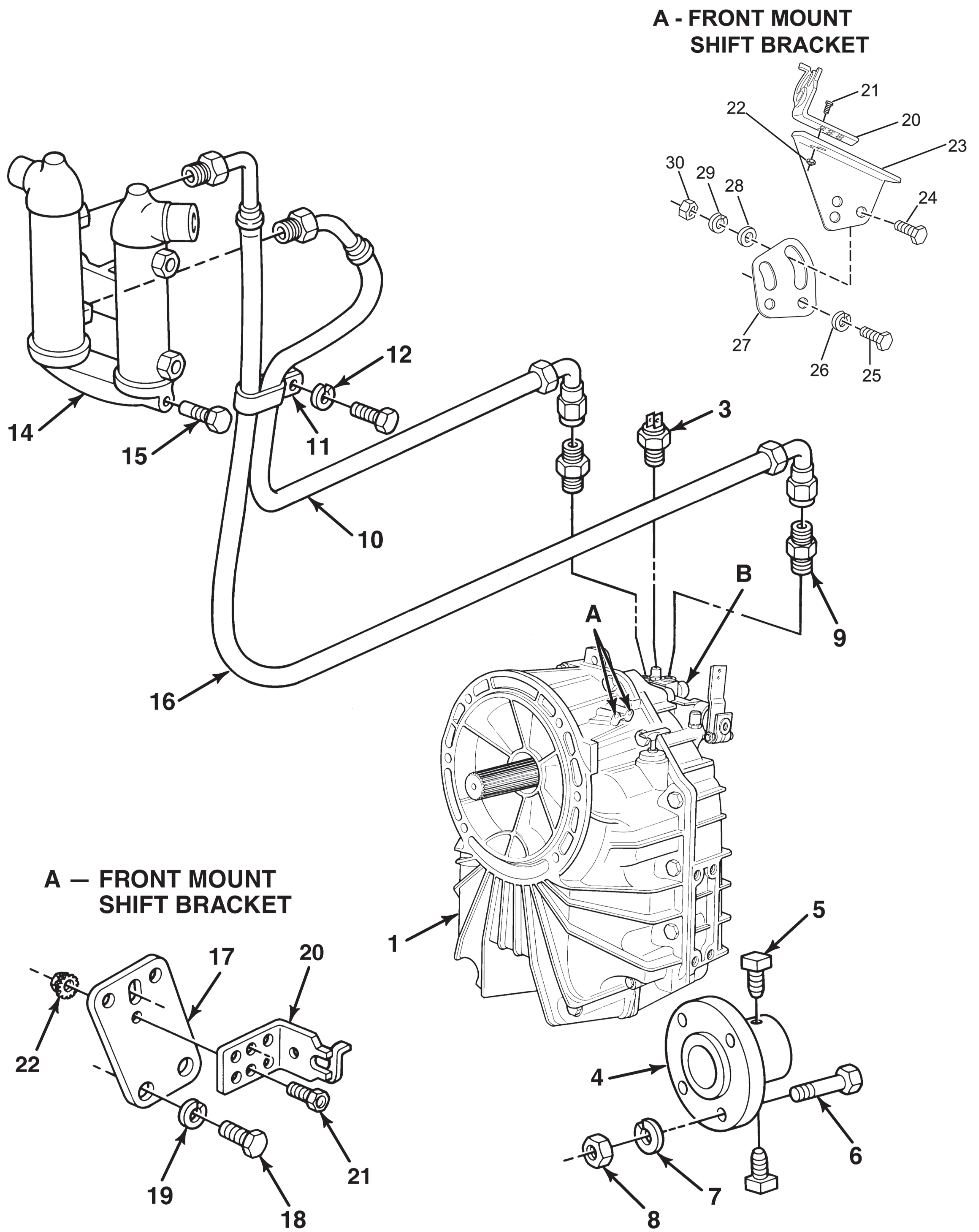
ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA156002B	**Transmission** (1.51:1 Reduction)	1
1	RA156002D	**Transmission** (1.99:1 Reduction)	1
1	RA156002E	**Transmission** (2.49:1 Reduction)	1
2	R153002	**Switch Kit, neutral start** (Not Shown)	1
2A	25542	**Switch & O-Ring Assembly** (Not Shown)	1
3	R020037	**Sender,** temperature alarm	1
4	R148001	**Coupler,** prop shaft (1" shaft)	OPT
4	R148002	**Coupler,** prop shaft (1-1/8" shaft)	OPT
4	R1480034	**Coupler,** prop shaft (1-1/4" shaft)	OPT
4	R148004	**Coupler,** prop shaft (1-3/8" shaft)	OPT
4	R148005	**Coupler,** prop shaft (1-1/2" shaft)	OPT
4	R148007	**Coupler,** prop shaft (1-3/4" shaft)	OPT
4	R148008	**Coupler,** prop shaft (2" shaft)	OPT
5	2000090	**Screw,** set – coupler	2
6	22136	**Bolt,** coupling (1-1/2")	4
7	93400000	**Lockwasher,** coupling bolt	4
8	95410201	**Nut,** coupling bolt	4
9	R024010	**Elbow,** hose – transmission (90-degree)	1
10	18202	**Hose Assembly,** transmission to cooler (60")	1
11	20247	**Clamp,** oil line retaining	1
12	92300200	**Washer,** retaining clamp bolt	1
13	93200000	**Lockwasher,** retaining clamp bolt	1
14	90405100	**Bolt,** retaining clamp	1
15	98123	**Oil Cooler Assembly** (RWC only)	1
15	98570	**Oil Cooler Assembly** (FWC only)	1
16	R168005	**Zinc,** sacrificial	1
17	18201	**Hose Assembly,** transmission to cooler (46")	1
18	R024008	**Elbow,** hose – transmission (90-degree)	1
19	RS467	**Nipple,** pipe (3")	1
20	22112	**Clamp,** oil line retaining	2
21	96341	**Shift Bracket** (Front Entry)	1
22	R090086	**Cable Clip,** single cable	1
22A	22232	**Cable Clip,** dual cable kit	OPT
23	91000050	**Bolt,** clip attaching (1/2")	2
24	95000060	**Nut,** attaching bolt	2


19
18
20
17
11
12
13
14
15
A — FRONT MOUNT SHIFT BRACKET
16
10
3
9
2
1
5
4
A
6
7
8

TRANSMISSION AND RELATED COMPONENTS (VELVET DRIVE 5000) - FIGURE 25

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA157020B	**Transmission** (1.50:1 Reduction) Down Angle	1
1	RA157020C	**Transmission** (2.00:1 Reduction) Down Angle	1
1	RA157020D	**Transmission** (2.45:1 Reduction) Down Angle	1
1	RA157020E	**Transmission** (2.80:1 Reduction) Down Angle	1
1	RA156008	**Transmission** (1.25:1 Reduction) V-Drive	1
1	RA156008A	**Transmission** (1.50:1 Reduction) V-Drive	1
1	RA156008B	**Transmission** (2.00:1 Reduction) V-Drive	1
1	RA156008C	**Transmission** (2.50:1 Reduction) V-Drive	1
2	25542	**Switch,** neutral start	1
3	R020037	**Sender,** temperature alarm	1
4	R148001	**Coupler,** prop shaft (1" shaft)	OPT
4	R148002	**Coupler,** prop shaft (1-1/8" shaft)	OPT
4	R148003	**Coupler,** prop shaft (1-1/4" shaft)	OPT
4	R148004	**Coupler,** prop shaft (1-3/8" shaft)	OPT
4	R148005	**Coupler,** prop shaft (1-1/2" shaft)	OPT
4	R148007	**Coupler,** prop shaft (1-3/4" shaft)	OPT
4	R148008	**Coupler,** prop shaft (2" shaft)	OPT
5	2000090	**Screw,** set – coupler	2
6	22136	**Bolt,** coupling (1-1/2")	4
7	93400000	**Lockwasher,** coupling bolt	4
8	95410201	**Nut,** coupling bolt	4
9	30603	**Fitting,** hose	2
10	18203	**Hose Assembly,** transmission to cooler (50-1/2")	1
11	22112	**Clamp,** oil line retaining	2
12	93300000	**Lockwasher,** retaining clamp bolt	1
13	90345125	**Bolt,** retaining clamp	1
11	98123	**Oil Cooler Assembly** (RWC only)	1
14	98570	**Oil Cooler Assembly** (FWC only)	1
15	R168005	**Zinc,** sacrificial	1
16	18204	**Hose Assembly,** transmission to cooler (63")	1
17	98227	**Shift Bracket** (Front Entry)	1
18	R090086	**Cable Clip,** single cable	1
18	22232	**Cable Clip,** dual cable kit	OPT
19	91000050	**Bolt,** clip attaching (1/2")	2
20	95000060	**Nut,** attaching bolt	2

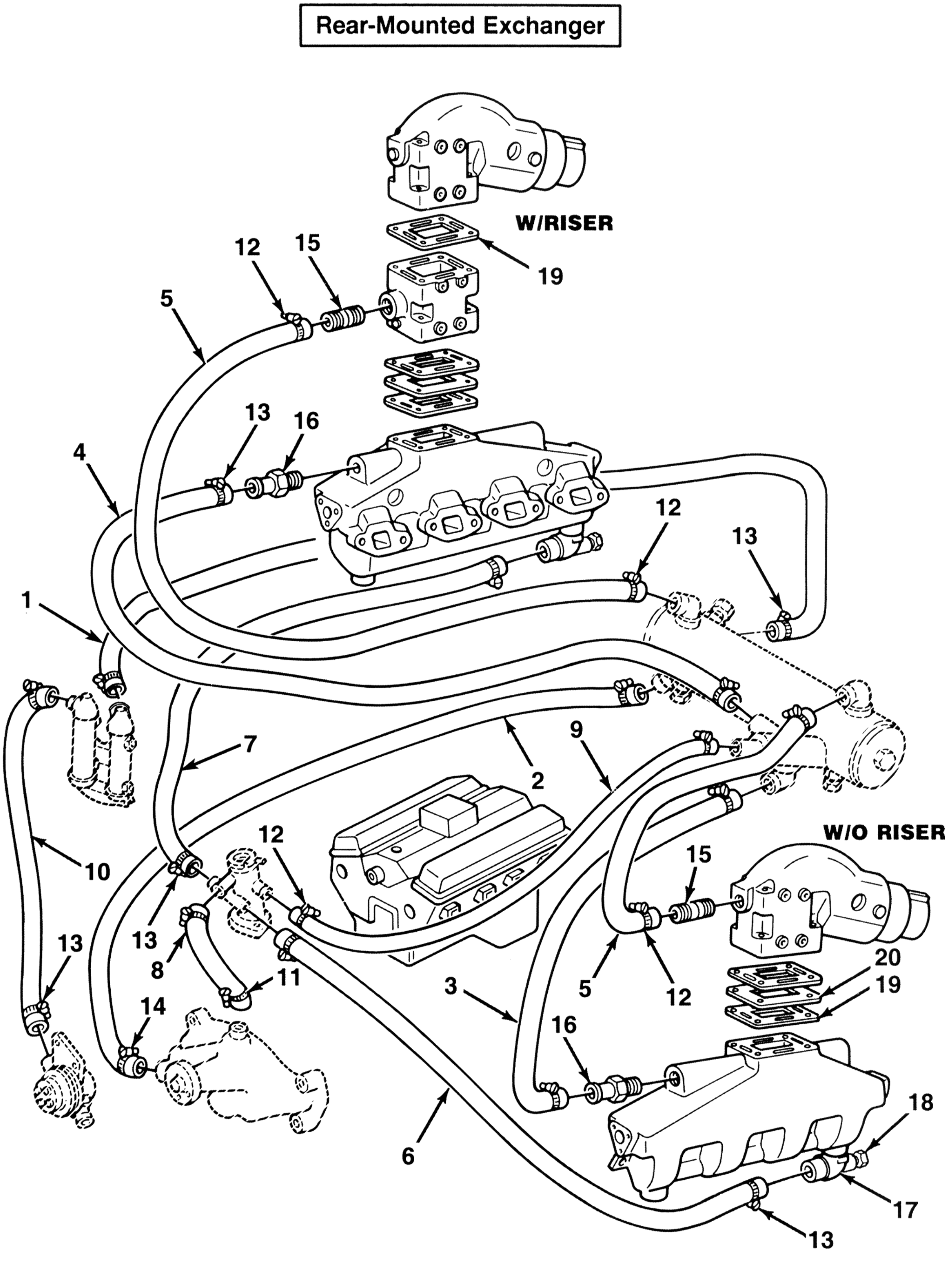
TRANSMISSION AND RELATED COMPONENTS (HURTH GEAR) - FIGURE 26



TRANSMISSION AND RELATED COMPONENTS (HURTH GEAR) - FIGURE 26

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA157022	**Transmission 630A** (1.22:1 Reduction)	1
1	RA157022A	**Transmission 630A** (1.55:1 Reduction)	1
1	RA157022B	**Transmission 630A** (2.00:1 Reduction) 8° Down	1
1	RA157022C	**Transmission 630A** (2.50:1 Reduction) Angle	1
1	RA157022D	**Transmission 630A** (2.70:1 Reduction)	1
1	RA156009	**Transmission 630V** (1.29:1 Reduction)	1
1	RA156009A	**Transmission 630V** (1.50:1 Reduction)	1
1	RA156009B	**Transmission 630V** (2.00:1 Reduction) V-Drive	1
1	RA156009C	**Transmission 630V** (2.50:1 Reduction)	1
2	25542	**Switch Kit,** neutral start (not shown)	1
3	R020037	**Sender,** temperature alarm	1
4	R148001	**Coupler,** propeller shaft (1" shaft)	OPT
4	R148002	**Coupler,** propeller shaft (1-1/8" shaft)	OPT
4	R148003	**Coupler,** propeller shaft (1-1/4" shaft)	OPT
4	R148004	**Coupler,** propeller shaft (1-3/8" shaft) 5" Flange	OPT
4	R148005	**Coupler,** propeller shaft (1-1/2" shaft)	OPT
4	R148007	**Coupler,** propeller shaft (1-3/4" shaft)	OPT
4	R148008	**Coupler,** propeller shaft (2" shaft)	OPT
5	2000090	**Screw,** set - coupler (1-1/4")	2
6	90418138	**Bolt,** coupling (1-3/8")	4
7	93400000	**Lockwasher,** coupling bolt	4
8	95410201	**Nut,** coupling bolt	4
9	30603	**Fitting,** transmission	2
10	18203	**Hose Assembly,** transmission to cooler (50-1/2")	1
11	22112	**Clamp,** oil line retaining	2
12	93300000	**Lockwasher,** retaining clamp bolt	1
13	90345125	**Bolt,** retaining clamp	1
14	98123	**Oil Cooler Assembly** (RWC Only)	1
14	98570	**Oil Cooler Assembly** (FWC only)	1
15	R168005	**Zinc,** sacrificial	1
16	18204	**Hose Assembly,** transmission to cooler (63")	1
17	98212	**Shift Bracket** (Front Entry)	1
18	TBD	**Bolt,** attaching	2
19	93200000	**Lockwasher,** attaching bolt	2
20	R090086	**Cable Clip,** single cable	1
20	22232	**Cable Clip,** dual cable kit	OPT
21	91000050	**Bolt,** clip attaching (1/2")	2
22	95000060	**Nut,** attaching bolt	2
23	R090202	**Shift Bracket**, cable clip attaching	1
24	RS0282	**Bolt**, shift bracket attaching	2
25	RS6529	**Bolt**, shift bracket attaching	2
26	93930000	**Lockwasher**, shift bracket attaching bolt	2
27	R090235	**Bracket**, shift	1
28	RS2674	**Washer**, shift bracket attaching bolt	2
29	RS2179	**Lockwasher**, attaching bolt	2
30	RS1027	**Nut**, shift bracket attaching bolt	2

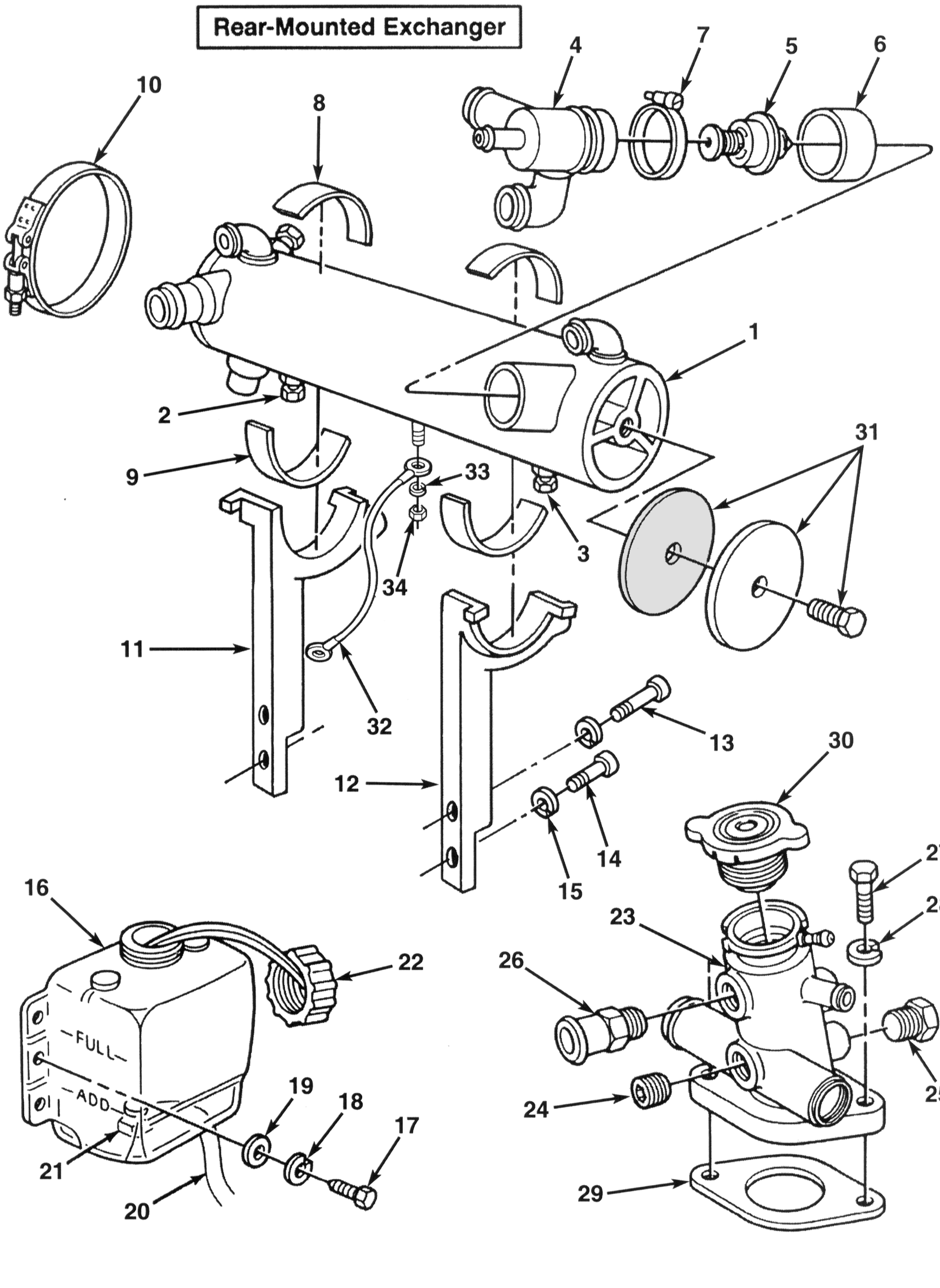
FRESH WATER COOLING COMPONENTS 1 (REAR MOUNTED EXCHANGER) - FIGURE 27



FRESH WATER COOLING COMPONENTS 1 (REAR MOUNTED EXCHANGER) - FIGURE 27

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	18368	**Hose**, oil cooler to exchanger	1
2	18306	**Hose**, circulation pump to exchanger	1
3	18307	**Hose**, thermostat housing to manifold (LH)	1
4	18369	**Hose**, thermostat housing to manifold (RH)	1
5	18309	**Hose,** exchanger to exhaust elbow (STD)	2
5	18370	**Hose,** exchanger to exhaust elbow (STD)	2
5	18311	**Hose**, exchanger to exhaust elbow ("V"-Drive)	2
6	18327	**Hose**, fill riser to manifold (Port)	1
7	18317	**Hose**, fill riser to manifold (Starboard)	1
8	18383	**Hose,** fill riser to circulation pump	1
9	18343	**Hose**, bypass - thermostat to fill riser	1
10	18300	**Hose,** raw water pump to oil cooler	1
11	RS3854	**Clamp**, hose (#12)	2
12	RS3851	**Clamp,** hose (#16)	4
13	RS3858	**Clamp**, hose (#20)	12
14	RS3855	**Clamp,** hose (#32)	2
15	97911	**Fitting,** exhaust elbow (1 " hose)	2
16	97852	**Fitting,** exhaust elbow (1-1/4" hose)	2
17	30624	**Fitting**, exhaust manifold (90-degree)	2
18	RS3552	**Plug,** drain	2
19	98127	**Gasket,** exhaust riser & elbow	4
		(Use of exhaust riser requires 6 gaskets)	
20	98124	**Block-Off Plate**, exhaust elbow	2
NI	23283	**FWC Kit** (rear mounted heat exchanger) Std. & V-drive	

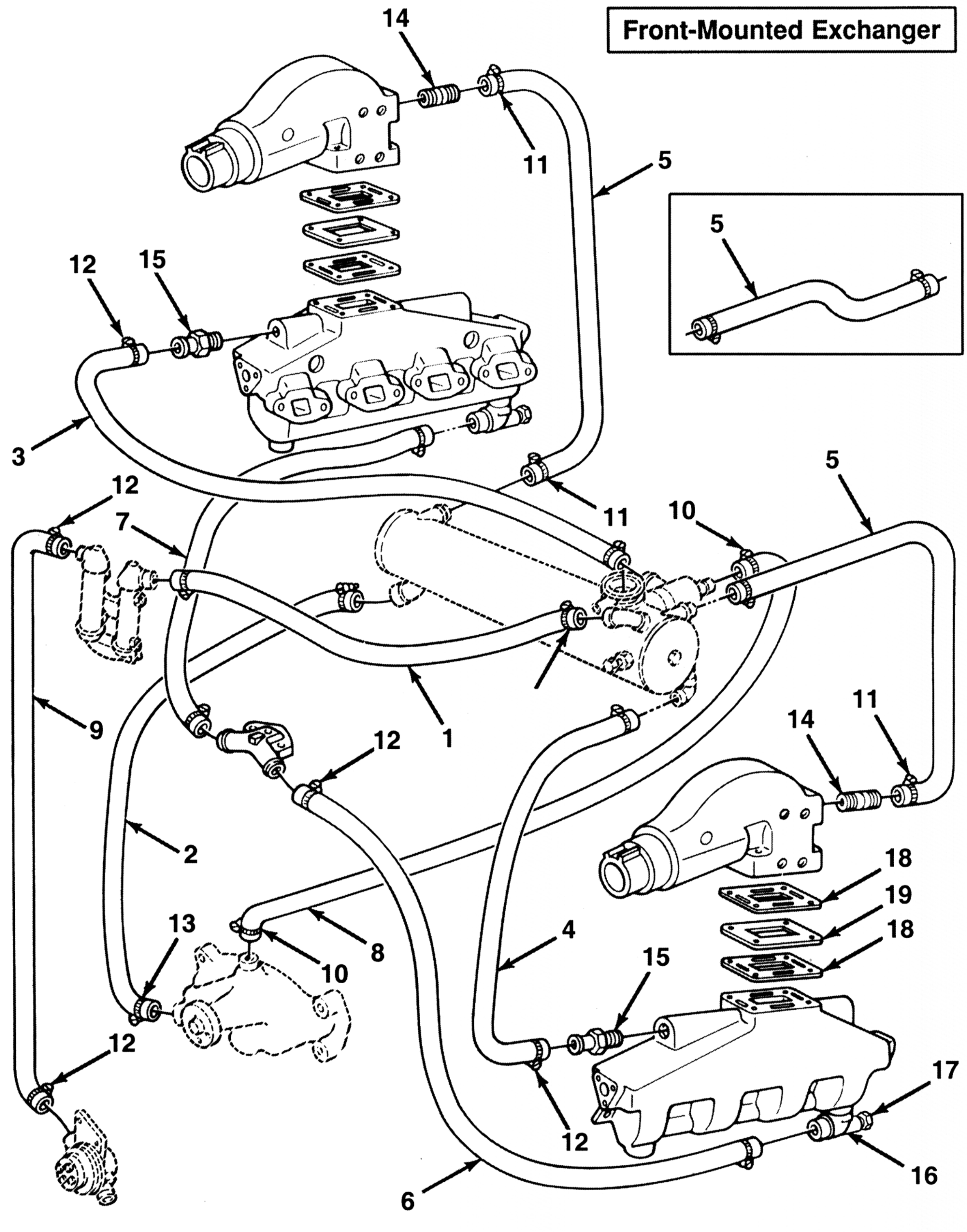
FRESH WATER COOLING COMPONENTS 2 (REAR MOUNTED EXCHANGER) - FIGURE 28



FRESH WATER COOLING COMPONENTS 2 (REAR MOUNTED EXCHANGER) - FIGURE 28

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98562	**Heat Exchanger Assembly**	1
2	R168005	**Zinc,** sacrificial	1
3	RS3552	**Plug**, drain (1/4”)	2
4	98202	**Thermostat Housing**	1
5	98203	**Thermostat** (170-degree)	1
6	98204	**Hose,** thermostat housing attaching	1
7	20868	**Clamp,** thermostat housing (#36)	2
8	R094041	**Isolator,** top	2
9	R094040	**Isolator,** bottom	2
10	R171009	**Clamp,** exchanger mounting	2
11	R090255	**Support,** exchanger (Starboard)	1
12	R090254	**Support,** exchanger (Port)	1
13	90368175	**Bolt**, support attaching	2
14	90368100	**Bolt**, support attaching	2
15	93300000	**Lockwasher**, attaching bolt	4
16	R146002	**Bottle,** coolant overflow	1
17	90205075	**Bolt,** bottle mounting (3/4”)	2
18	93200000	**Lockwasher,** mounting bolt	2
19	92200000	**Washer**, mounting bolt	2
20	R045139	**Tube,** overflow [48”]	1
21	R127084	**Clamp**, overflow tube	2
22	23527	**Cap,** coolant fill (7 lb)	1
23	98249	**Fill Riser**, fresh water	1
24	444705	**Plug**, pipe	1
25	RS3551	**Plug,** pipe (3/8”)	1
26	7140280	**Fitting,** water bypass hose	1
27	90305125	**Bolt,** riser attaching (1 -1/4”)	2
28	93300000	**Lockwasher**, attaching bolt	2
29	RM0121	**Gasket,** fill riser	1
30	R034006A	**Cap,** fill riser pressure (7 lb)	1
31	23540	**End Cap Kit**	AR
32	R101013	**Wire,** grounding	2
33	TBD	**Lockwasher,** ground stud	1
34	TBD	**Nut,** ground wire stud	1

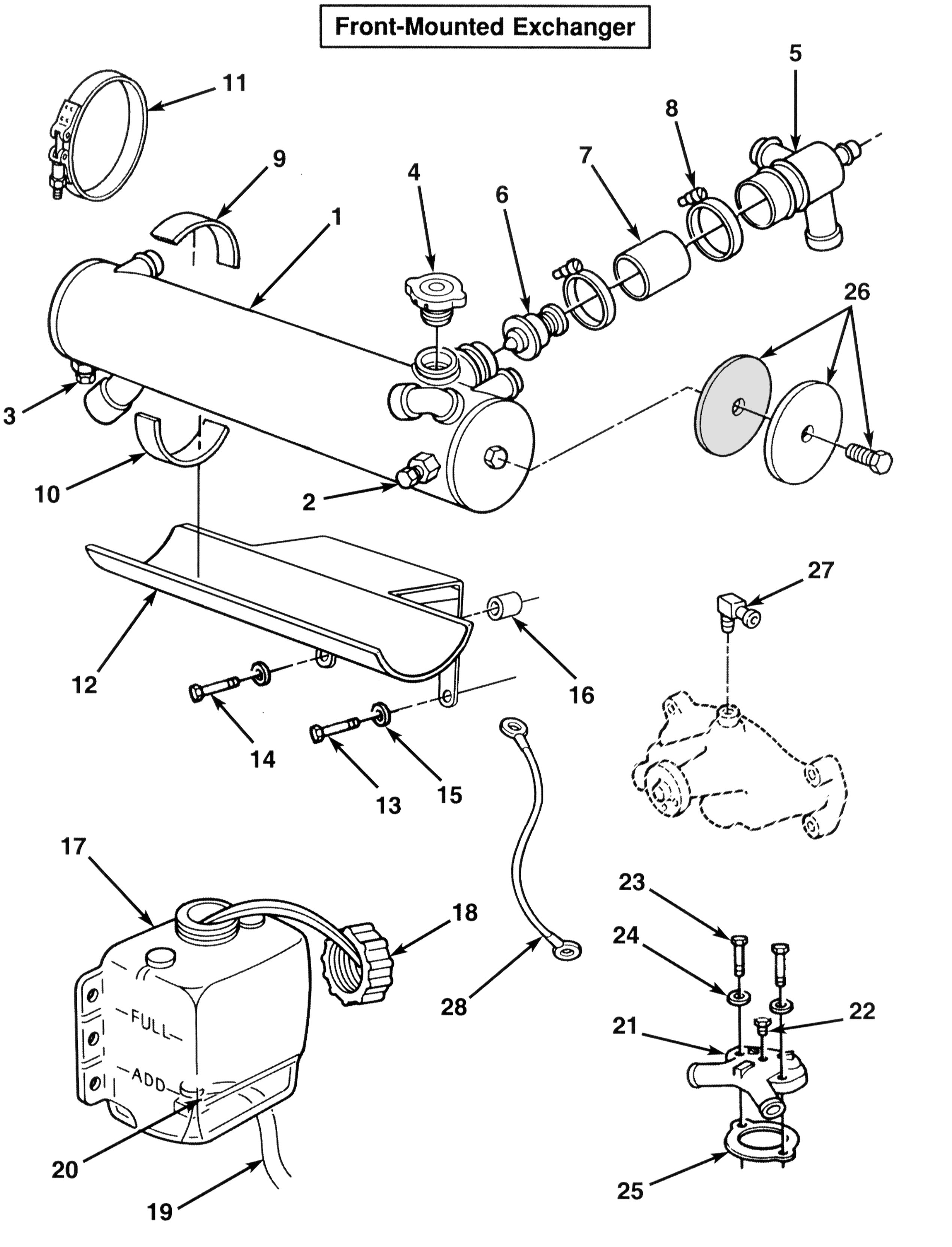
FRESH WATER COOLING COMPONENTS 1 (FRONT MOUNTED EXCHANGER - FIGURE 29



FRESH WATER COOLING COMPONENTS 1 (FRONT MOUNTED EXCHANGER - FIGURE 29

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	18393	**Hose**, oil cooler to exchanger	1
2	18400	**Hose**, circulation pump to exchanger	1
3	18401	**Hose**, thermostat housing to manifold (LH)	1
4	18402	**Hose**, thermostat housing to manifold (RH)	1
5	18396	**Hose,** exchanger to exhaust elbow (STD)	2
5	18397	**Hose,** exchanger to exhaust elbow (STD)	2
5	18398	**Hose**, exchanger to exhaust elbow (“V”-Drive)	2
6	18317	**Hose**, intake to manifold (Port)	1
7	18327	**Hose**, intake to manifold (Starboard)	1
8	20806	**Hose**, bypass **-** thermostat housing to water pump	1
9	18384	**Hose,** raw water pump to oil cooler	1
10	RS3854	**Clamp**, hose (#12)	2
11	RS3851	**Clamp,** hose (#16)	4
12	RS3858	**Clamp**, hose (#20)	10
13	RS3855	**Clamp,** hose (#32)	2
14	97911	**Fitting,** exhaust elbow (1 “ hose)	2
15	97852	**Fitting,** exhaust elbow (1-1/4” hose)	2
16	30624	**Fitting**, exhaust manifold (90-degree)	2
17	98127	**Gasket,** exhaust riser & elbow (Use of exhaust riser requires 6 gaskets)	4
18	98124	**Block-Off Plate**, exhaust elbow	2
NI	RS3552	**Plug,** drain	2
NI	23296	**FWC Kit** (Standard application) (Front)	

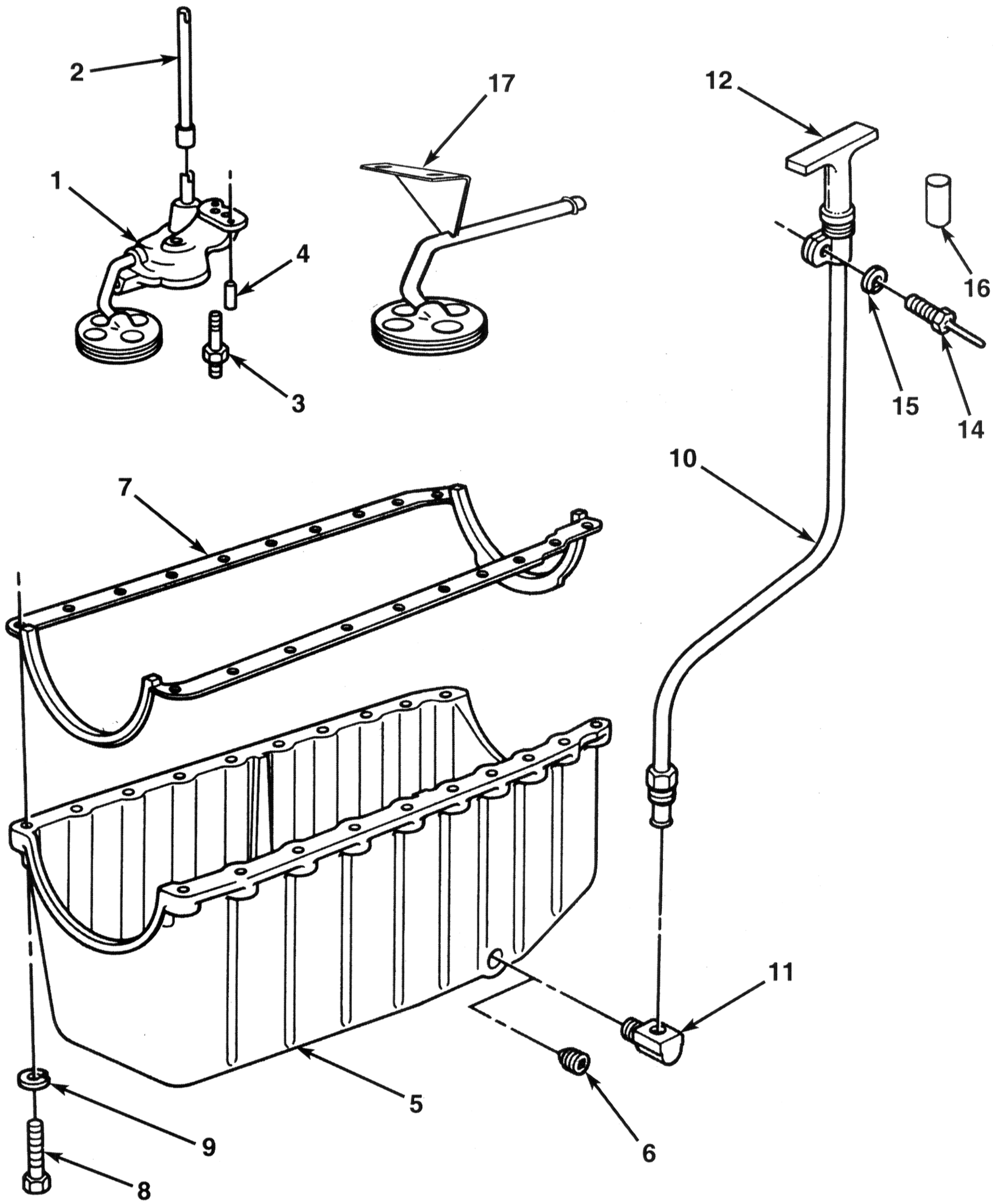
FRESH WATER COOLING COMPONENTS 2 (FRONT MOUNTED EXCHANGER - FIGURE 30



FRESH WATER COOLING COMPONENTS 2 (FRONT MOUNTED EXCHANGER - FIGURE 30

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	98636	**Heat Exchanger Assembly** (Early style)	1
1	98653	**Heat Exchanger Assembly** (Late style)	1
2	R168005	**Zinc,** sacrificial	1
3	RS3552	**Plug**, drain (1/4”)	2
4	98201	**Cap**, exchanger pressure (7 lb)	1
5	98638	**Thermostat Housing**	1
6	98203	**Thermostat** (170-degree)	1
7	98204	**Hose,** thermostat housing attaching	1
8	RS3860	**Clamp,** thermostat housing (#36)	2
9	R094041	**Isolator,** top	2
10	R094040	**Isolator,** bottom	2
11	R171009	**Clamp,** exchanger mounting	2
12	98634	**Bracket,** exchanger mounting	1
13	90405100	**Bolt**, support attaching (7/16 X 1”)	1
14	90405150	**Bolt**, support attaching (7/16 X 1-1/2”)	1
15	93400000	**Lockwasher**, attaching bolt	2
16	98639	**Spacer**, mounting bracket attaching	1
17	R146002	**Bottle,** coolant overflow	1
18	23527	**Cap,** coolant fill	1
19	R045139	**Tube,** overflow [48”]	1
20	R127084	**Clamp**, overflow tube	2
21	97851	**Housing**, intake water distribution	1
22	RS3551	**Plug,** vent (1/4”)	1
23	90305125	**Bolt,** riser attaching (1 -1/4”)	2
24	93300000	**Lockwasher**, attaching bolt	2
25	RM0121	**Gasket,** housing to intake	1
26	23540	**End Cap Kit** (exchanger)	AR
27	80948	**Fitting,** 90 deg water pump bypass	1
NI	R101013	**Wire,** ground (heat exchanger)	1

ALUMINUM OIL PAN and OIL PUMP ASSEMBLY - FIGURE 31



ALUMINUM OIL PAN and OIL PUMP ASSEMBLY - FIGURE 31

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	RA070011	**Oil Pump Assembly**	1
2	R058055	**Shaft,** oil pump to distributor	1
3	7100470	**Stud,** oil pump mounting	1
4	R022022	**Pin**, dowel - oil pump aligning	2
5	98098	**Oil Pan,** cast aluminum	1
6	RS3551	**Plug**, 3/8 brass	AR
7	RM0230	**Gasket,** oil pan	1
8	90205150	**Bolt**, oil pan mounting	20
9	93200000	**Lockwasher,** mounting bolt	20
10	R041072	**Dipstick Tube**	2
11	R024115	**Elbow,** dipstick tube to oil pan	2
12	98287	**Dipstick**, oil level (yellow/black lettering)	1
13	R127015	**Clamp,** dipstick tube attaching	2
14	98235	**Bolt,** clamp attaching	2
15	93300000	**Lockwasher,** attaching bolt	2
16	45343	**Cap**, dipstick tube	1
17	98434	**Oil Pickup Screen,** (V-Drive Application Only)	1
NI	7050350	**Stud,**,oil screen mounting	2
NI	7050360	**Nut,** oil screen attaching	2

This Page Was

Intentionally

Left Blank

To help keep your engine running trouble free, specifiy only genuine Crusader Engine replacement parts.